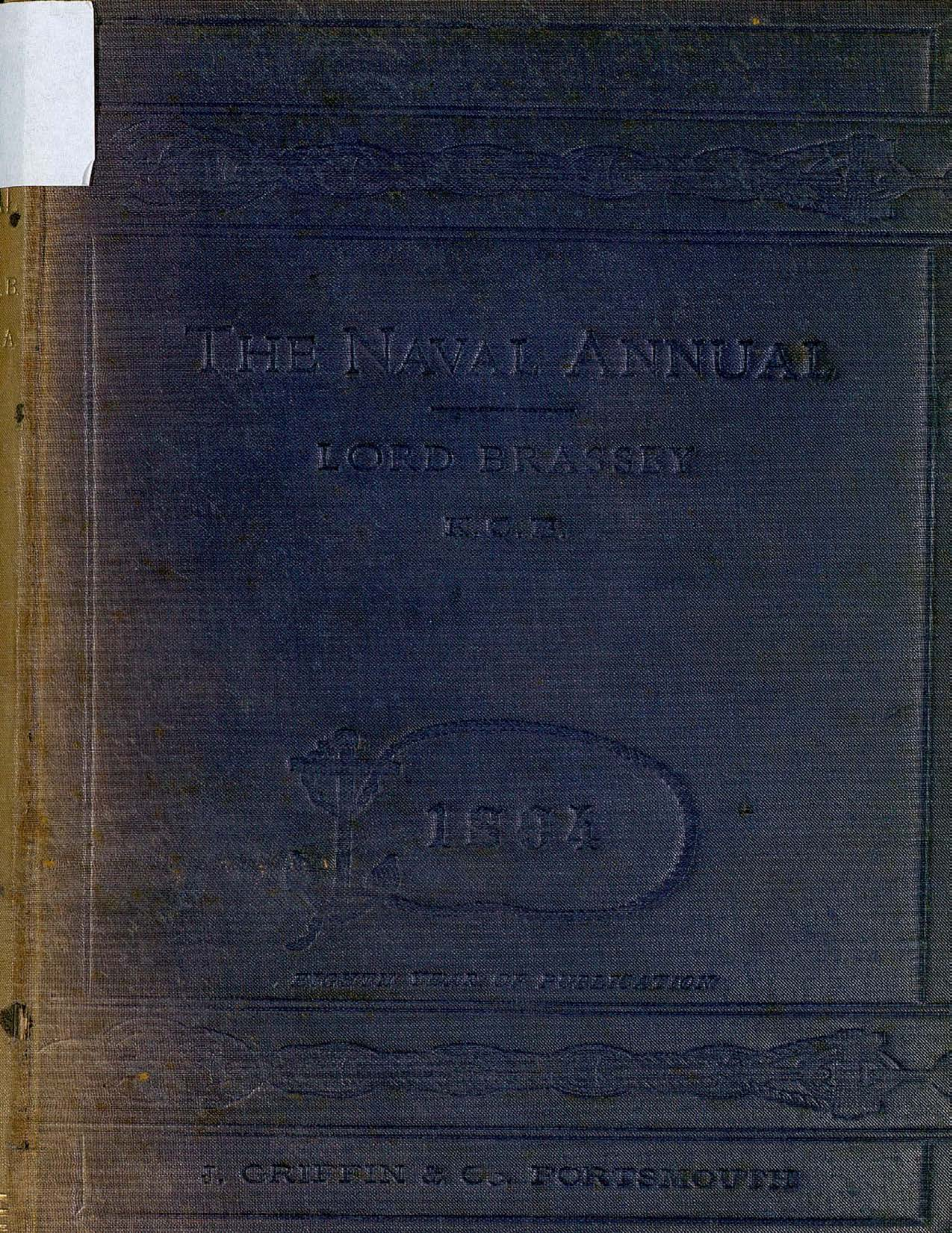
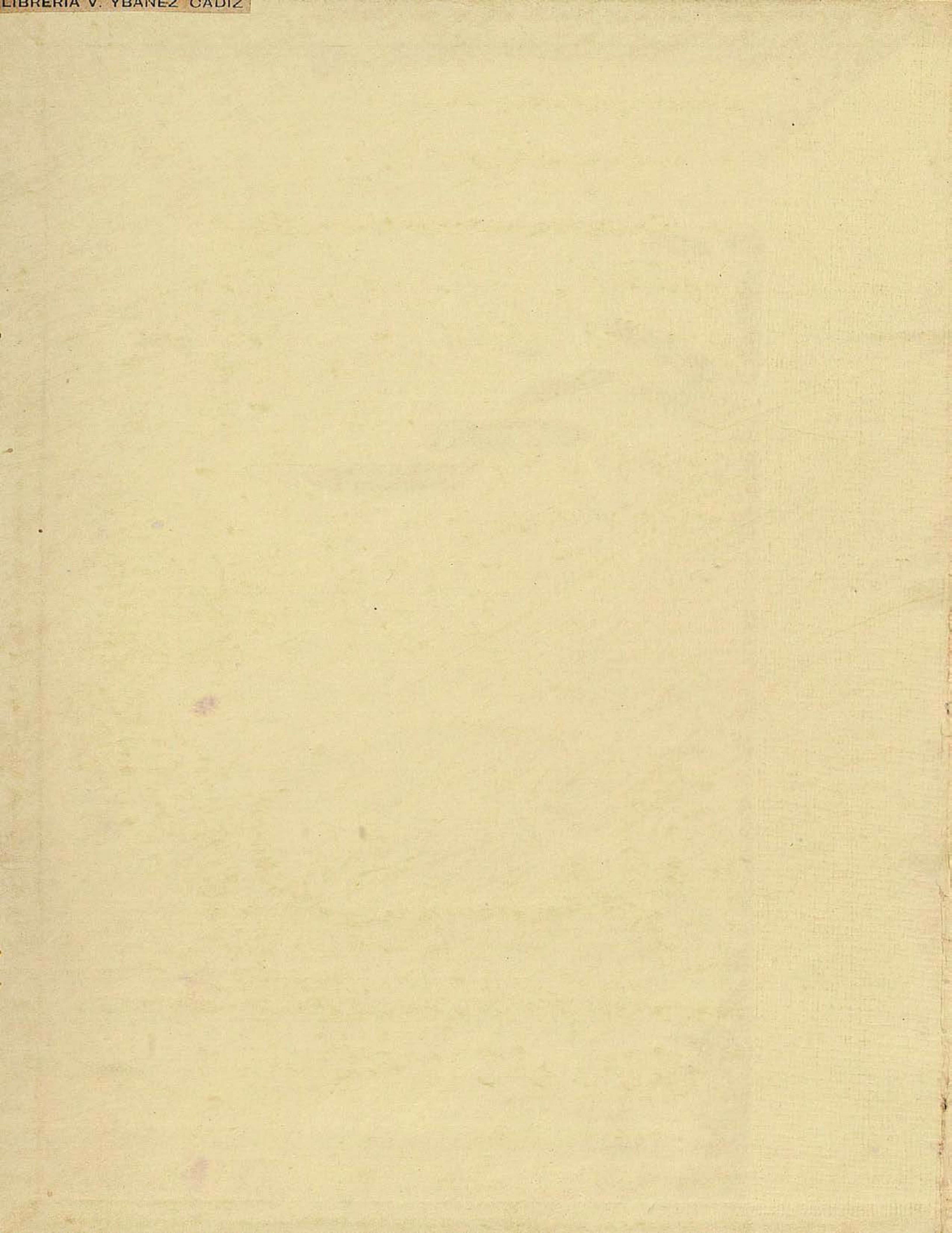
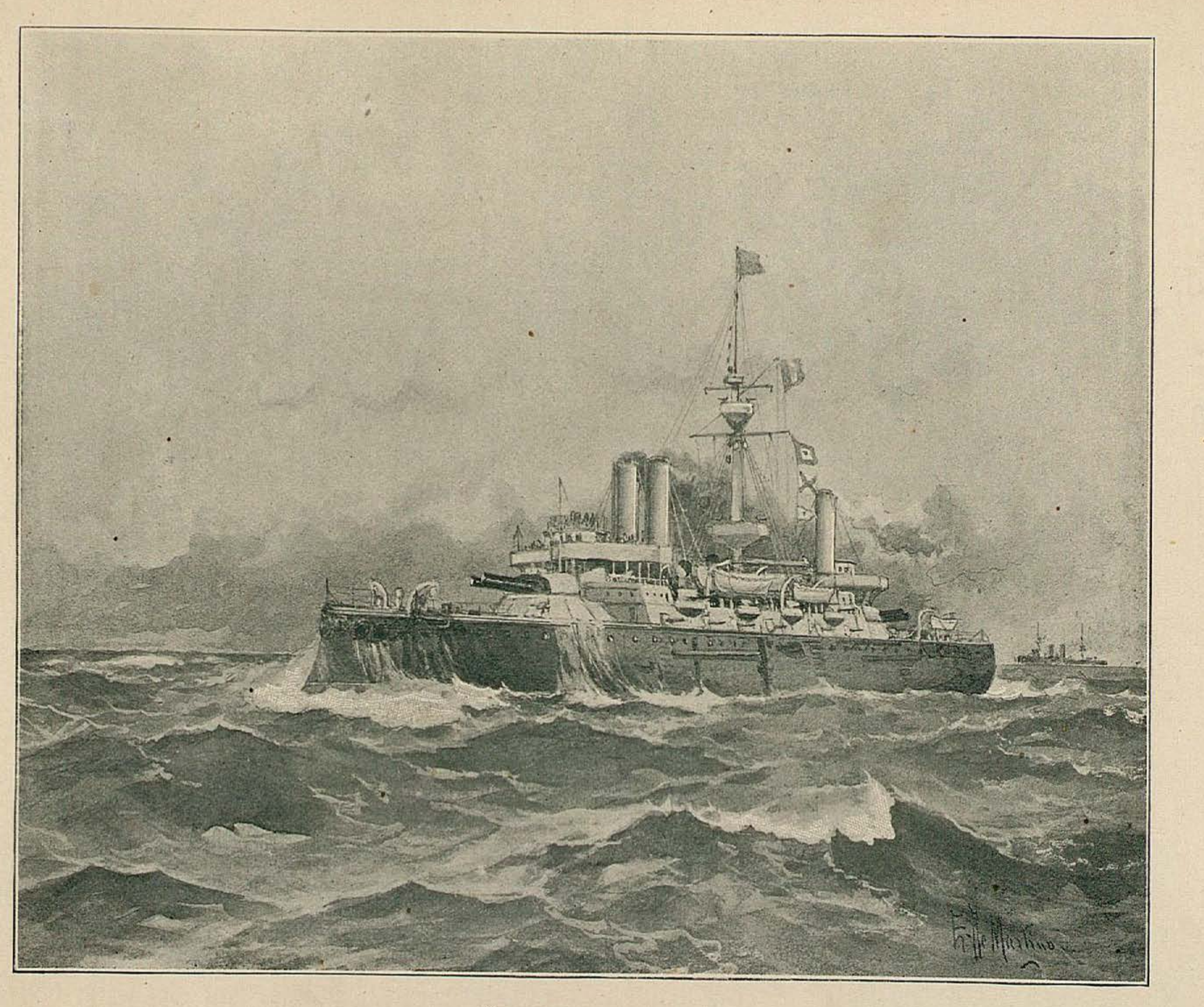

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BOSTON


THE NAVAL ANNUAL
LORD BRASSEY
K.C.B.
1894
J. GRIFFIN & Co. PORTSMOUTH


LIBRERIA V. YBANEZ CADIZ



"RE UMBERTO."

ITALIAN BATTLE-SHIP

THE

NAVAL ANNUAL,

1894.

EDITED BY

T. A. BRASSEY.

PART I.—Lord Brassey, K.C.B.; Vice-Admiral Colomb; Captain Eardley-Wilmot, R.N.; Commander C. N. Robinson, R.N.; Professor J. K. Laughton, R.N.; Messrs. E. Weyl, R. C. Oldknow, W. Laird-Clowes, J. R. Thursfield, and a Student of Naval History.

PART II.—F. K. Barnes, M.I.N.A.; W. Laird-Clowes.

PART III.—Captain Orde Browne, late R.A., Lecturer on Armour to the R.A. College.

PART IV.—Official Reports, and Navy Estimates.

PART V.—Lord Brassey, K.C.B.

"No student of naval history can doubt that the moral and strategical advantage enjoyed by the superior naval force is out of all proportion to the mere numerical superiority involved. That advantage we must at all cost secure, if we are to hold our Empire by any tenure less precarious than that of sufferance."—*The Times.*

1894.

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PREFACE.

THE NAVAL ANNUAL for 1894 has been prepared for publication under extraordinary pressure in order that the book might be published as nearly as possible on the same date as last year, viz., May 1st. The work of compilation could not be commenced before the end of February. Many of the chapters were written, and the whole book was compiled and passed for press within little more than a month, a performance which would have been quite impossible without the cordial co-operation of our printers. Lord Brassey did not return to England till the middle of April, and his contribution has consequently had to be placed at the end of the volume. He had anticipated that he would be prevented by pressure of work on the Opium Commission from contributing to the present number. Our readers must pardon the Editor if matter has been included in Part I. which would have had no place there if the nature of Lord Brassey's contribution had been known to him.

In addition to the writers whose work is familiar to the readers of these pages, we have this year secured the assistance of Admiral Colomb (not for the first time), Captain Robinson, the Naval Editor of the *Army and Navy Gazette*, and Professor Laughton, the well-known authority on Naval History. The subjects dealt with are various, but the agitation for the increase of the Navy in 1893 has had much to do with the selection made. Many critics will doubtless remark that the manning of the Navy is a subject which is not treated in the present volume. It was fully dealt with last year, and

we propose to devote considerable space to this important matter in our next number.

We are glad to be able to give this year a plate of the Renown, which we feel sure will be much appreciated. That excellent publication, 'Le Yacht,' has furnished us with a general idea of the new French battle-ships.

To the energy of the Naval Correspondents of the public press, both in England and abroad, the *Naval Annual* is always much indebted, though the task of estimating the value of the conflicting statements of different authorities is at times a difficult one. The admirable naval notes, which are now to be found in the Journal of the United Service Institution, have also been of great assistance.

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PART I.

CHAPTER I.

Progress of British Navy, 1893-4.

With a Note on Naval Engineering by R. C. Oldknow.

In the present chapter an attempt is made to bring together the principal events in the progress of the British Navy for 1893–4 which are not dealt with in subsequent pages. The task is not a satisfactory one, and necessarily assumes rather a patchwork character.

The period within which the vessels to be built under the Naval Defence Act were to be completed will have closed before the *Naval Annual* for 1894 is published. The Director of Naval Construction has every reason to be proud of the fact that the seventy ships building under his direction will be completed as nearly as possible within the specified time, and at a very slight excess over the original estimate. The following table shows the number of ships in each class to be built under the Act; the number completed in March, 1893; and the number now completed :—

Class.	Number to be built.	Completed March, 1893.	Completed March, 1894.
1st Class Battleships	10	2	10
1st Class Cruisers.	9	3	9
2nd Class ,, ...	29	21	24
3rd Class ,, ...	4	4	4
Torpedo Gunboats	18	5	14
Totals	70	35	61

The naval history of the year is, omitting the terrible loss of the Victoria, principally a record of ships completed and of the results of their trials. In no one year since the introduction of armoured ship-building has the naval strength of the Empire been so largely increased as it has been in the course of the year 1893-94. On the other hand, the ships which have been laid down, omitting torpedo-

boat destroyers, are fewer in number than they have been for many years past.

Battle-ships.

Ships completed.

The Empress of India, Ramillies, Resolution, and Centurion were completed before the end of 1893, and are already in commission. The Revenge, Royal Oak, Repulse, and Barfleur have been through their trials, and will be ready for sea in April.

Steam trials.

Some particulars of the trials of these first-class battleships (with those of the Royal Sovereign, as recently given by Mr. White) have been condensed in the following table :—

	Mean draught of water on trial.	Natural Draught.				Forced Draught.			
		Air pressure.	I.H.P.	Rev.	Speed, by log.	Air pressure.	I.H.P.	Rev.	Speed, by log.
	Ft. in.	Inches.				Inches.			Knots.
Empress of India	25 6	·51	9507	96·2	15·25	1·	11,625	102	18
Resolution .	24 8	·2	9248	97	16·73	·63	11,402	104	17·92
Revenge . .	25 6	·19	9177	96·6	17·2	·46	11,536	102	17·5
Royal Oak .	25 0	·27	9221	96·2	16·5	·98	11,608	103	18·27
Ramillies . .	25 2	·22	9415	96·7	16·75	·35	11,571	103	17·25
Repulse . .	..	·45	9588	99·4	17·8	·91	11,314	104	18·2
Royal Sovereign .	27 6	·39	9661	97	16·37	1·6	13,360	106	18†
		..	9779	99	16·77*				

*On measured mile. † Calculated from revolutions from data obtained on the measured mile.

The designed load draught of the Royal Sovereign class is 27 ft. 6 in., and the estimated horse-power, with forced draught, is 13,000. The Royal Sovereign herself was tried at 27 ft. 6 in. load draught and about 14,200 tons displacement. It is apparent from the above table that in no other case were the ships down to their designed load draught. On the other hand, they were only required to develop 11,000 indicated horse-power, which, however, in most cases they considerably exceeded. The chief object of these trials was to ascertain if the machinery would work satisfactorily at certain specified powers. They are unsatisfactory from a public point of view, as the taxpayer is naturally anxious to know if new vessels fulfil the promises of the designers. There is no reason to doubt that the battleships completed during the past year are capable of equalling the performances of the Royal Sovereign under similar conditions.

Performances at sea.*

The performances at sea of these vessels have been satisfactory. During a run out to Gibraltar the Empress of India made 15·7 knots in a four hours' full-power run under natural draught, and 14·18 knots during the 20 hours' run at ⅗ power. The Royal Sovereign, on

* See Mr. White's paper, read at the Institute of Naval Architects, on 'The Qualities and Performances of recent First-class Battleships.'

H.M.S. "HOOD."

a trial made from Plymouth to Gibraltar, ran for 72 hours, at an average speed of 15 knots per hour, the daily rate of coal consumption being 166 tons, the mean displacement for the voyage being 14,650 tons. The weather was fair except for a few hours at the end of the voyage.

More than twelve months ago rumours were current that the Royal Sovereign class were heavy rollers, but last January the behaviour of the Resolution in a gale of wind in the Bay of Biscay gave rise to many exaggerated statements in the newspapers. A new ship, just commissioned, does not meet an Atlantic gale under the best conditions. As Sir Edward Reed pointed out in the *Times*, there is no reason to doubt the stability of this class, though, under certain conditions, viz., when the period of the waves happens to synchronize with their period of oscillation, they will roll heavily. Such damage as the Resolution suffered in the present instance appears to have been simply due to the fact that she shipped some heavy seas, which could hardly have been anticipated by those in charge. Water found its way below because the openings amidships were not properly secured.

Centurion. Barfleur.

The Centurion underwent her eight hours' natural draught trial on the 19th September. Her trim, on trial, was 25 ft. forward and 26 ft. aft, so that her mean draught was the same as her designed draught. With a boiler pressure of 146½ lb., and a mean of 96 revolutions, the engines developed 7703 horse-power, the mean air pressure being 0·18 in., and the coal consumption equal to 1·9 lb. per indicated horse-power per hour. The mean speed during the eight hours was 17½ knots. The forced draught trial took place on the 6th October, with the following results: steam in boilers, 146 lb.; vacuum, 27·6 in. starboard, 27·1 port; revolutions, 104·7 starboard, 104·8 port, displaying remarkable uniformity in the action of the two sets of engines; collective indicated horse-power, 13,214. The mean air pressure was 1·58 in., and the coal consumption 2·24 lb. per indicated horse-power per hour. The mean speed was 18·5 knots. The Barfleur attained a speed of 17·1 knots with 9934 horse-power on her natural draught, and 17·5 knots with 13,163 horse-power on her forced draught trials. The speeds given were obtained by log, which is admittedly inaccurate at high speeds.

Reconstruction. Devastation.

The strength of the Navy has not only been increased by the addition of new ships. The Devastation, like her sister ship the Thunderer, has been reconstructed, re-engined, and re-armed, at an estimated cost of £156,261, about half her original cost. We have condensed the following account from the *Times* of Sept. 13th :—

"The Devastation underwent her eight hours' steam trial under

natural draught yesterday. Her trim was 25 ft. forward and 26 ft. 8½ in. aft. The average boiler pressure was 140 lb., and the mean vacuum was as high as 28·2 in. starboard and 28½ in. port. With 94·4 and 93·2 revolutions the engines developed an indicated horse-power of 3139 and 2861, giving a collective mean power of 6000 horses, or in other words, 500 beyond the contract. The mean air pressure in the stokeholds was half an inch, and the coal consumption 1·8 lb. per unit of horse-power per hour. The speed obtained was 13·25 knots as taken by patent log."

On her forced draught trials a speed of 14·5 knots was obtained, with 7,214 indicated horse-power, and 2 inches air pressure.

"The rehabilitation of the earliest of our sea-going mastless turret ships must be regarded as a noteworthy naval event. Laid down in November, 1869, launched at Portsmouth on July 12, 1871, and first commissioned by Captain Hewett on August 17, 1872, the Devastation has now been brought up to modern requirements as a fighting ship. The central internal portion of the hull has been rebuilt. This modification involved the re-arrangement of the main watertight subdivisions, the construction of additional coal bunkers, the fitting of new watertight doors and gearing, and boiler, engine, shaft, and thrust bearings, new casings between decks, and new ventilating arrangements. In the upper works, too, many alterations are apparent. The ship has a full equipment of boats, and a fighting platform or military top has been added to her mast. This enables a couple of 3-pounder quick-firing guns to be mounted in one of the most effective positions on board. The changes between her past and her present gun equipment will be readily perceived from the following:—

Old.	New.
Four 12 in. 35-ton R.M.L. guns.	Four 10 in. 29-ton B. L. guns.
One 9-pounder 8 cwt.	Two 7-pounder 200 lb. guns.
One 7-pounder 200 lb.	Six 6-pounder Q.F. guns.
Six 6-pounder Q.F. guns.	Eight 3 lb. Q.F. guns.
Two ·45 in. 5-barrel Gardners.	Five 5-barrel ·45 in. Gardners.
Two above-water torpedo tubes.	Two submerged torpedo tubes.

The new propelling machinery, furnished by Messrs. Maudslay, Sons, and Field, consists of two sets of inverted triple expansion engines, of the collective power of 5,500 with natural draught, and 7,000 with forced draught."

Agincourt. The Agincourt, now officially known as a first-class armoured cruiser, is of 10,600 tons displacement and of 4000 horse-power with natural draught. She has this financial year undergone an extensive repair in Chatham Dockyard at an outlay of upwards of £30,000, and will shortly be ready for being commissioned to relieve the Victor Emanuel as receiving ship at Hongkong. In addition to the

repairs to her hull, the Agincourt has been supplied with new boilers, and has been furnished with a new rig, two of her five masts having been removed, and the vessel barque-rigged. Her armament has also been increased by the addition of quick-firing guns.

Monarch and Sultan.

The Monarch and Sultan have been taken in hand. The former will be completed in 1894–5, the latter in 1895–6. For further details as to reconstruction we must refer our readers to the First Lord's memorandum in Part III.

Salvage of Howe.

We cannot leave the subject of battleships without alluding to the salvage of the Howe and the loss of the Victoria. When we went to press last year it seemed likely that the former, which had been over four months on the rocks at Ferrol, would become a total loss. Thanks to the skill and energy of all concerned, she was successfully floated. Temporarily repaired at Ferrol, she made the voyage under her own steam to Chatham. She was ready again for sea in four months, a performance which reflects great credit on the dockyard staff and workmen.

Loss of Victoria

Two years ago we had to lament the loss of the Serpent with nearly all hands on the coast of Spain. This year we have to record the loss of the Victoria with over 350 officers and men and one of the ablest admirals in the Service. A great naval victory could hardly have cost the country more. The mystery which surrounds this disaster, so terrible in its consequences and so dramatic in its incidents, will never be explained—as Mr. Thursfield says in a later chapter—till the sea gives up her dead. As in the case of the Serpent, so in those twelve minutes on board the Victoria, officers and crew alike afforded by their conduct a splendid example of the discipline and courage which animates the British Navy. Had they died amidst the roar and smoke of battle they could not have served their country better.

First-class cruisers.

Of the nine first-class cruisers to be built under the Naval Defence Act only three had been completed before March, 1893. The remaining six ships, the Crescent and the five contract-built ships, have all passed through their trials, and are ready for sea. The Crescent steamed 18·6 knots with 10,370 horse-power. She was tried at her designed load-draught of 24 ft. 6 in., but the trials, which we give below, took place when the vessels were not down to their designed load-draught. On the other hand, the engines were not required to develop within 2000 of their designed horse-power. It was stated by Mr. Oldknow last year that, by reducing the grate area and altering the eccentrics in all the cruisers of this class, except the Edgar and Grafton, the Admiralty had taken steps to prevent the boilers being pressed.

The Endymion, at a draught of 20 ft. 7 in., attained a speed of 20·9 knots with 10,646 horse-power, and the St. George, at a draught of 21 ft. 5 in., a speed of 20·25 knots with 10,536 horse-power. The Gibraltar steamed 20·4 knots with 10,536 horse-power, and the Theseus 18·6 knots with 10,608 horse-power.

Second-class cruisers. All the twenty-one second-class cruisers of the Apollo type, with the exception of the Sybille, have now been completed for sea, and are either in commission or in the Fleet Reserve. The Sybille is still in dockyard hands at Devonport, owing to defective boilers.

Astræa class. Four cruisers of the Astræa class—the Charybdis, Flora, Forte, and Hermione—have been launched during the year 1893–94. The remaining four cruisers of this class were launched previously. They have already been fully described in the pages of the *Naval Annual*. They are of 4,360 tons displacement, are armed with two 6 in. and eight 4·7 in. besides smaller quick-firing guns, and were designed to steam 19·5 knots with 9000 horse-power. The following particulars of the trials of the Astræa from the *United Service Magazine* will be of interest:—"In the eight hours' run under natural draught, a speed of 19 knots by log was attained with 7600 indicated horse-power, and an air pressure of ·44 of an inch. In the four hours' run under forced draught she attained a speed of 19·75 knots with 9,112 indicated horse-power, or 112 over the contract, with an air pressure of 1·44 inches. The ship was down to her load-draught, and there was a strong breeze and heavy sea running, so that the results may be considered most satisfactory."

Vulcan. The forced draught trials of the torpedo depôt ship Vulcan are amongst the most important of the past year. The report reached us too late for publication in the *Naval Annual* for 1893.* At one time it appeared most unlikely that this ship would ever attain her designed speed. We quote the following from the *Engineer*:—

"The alterations to the boilers of H.M.S. Vulcan, which we indicated as being in progress in our issue of the 7th October last, having been completed, the ship was taken out of harbour on Tuesday, the 14th inst., to undergo trials of her machinery at the full-forced draught pressure which the boilers were originally designed to withstand. Briefly, the alterations referred to consist in fitting the new Admiralty ferrule to the tubes at the combustion chamber ends, replacing the tubes which had been removed, with the idea of replacing the circulation of the water among the tubes, and giving it free access to the tube plates, and in lengthening the grates which had been reduced to prevent overheating. These earlier alterations had not been successful in preventing leaky boiler tubes at even

* They took place on March 30th.

moderate speeds, and at one time it had even been determined to remove the boilers altogether and supply the ship with a new set, a sum of £42,000 having been set down in the Navy Estimates last year for that purpose. Considerable interest, not to say anxiety, as to the result of Tuesday's trial was therefore manifested by all who were in any way responsible for its success, and it was felt that the new ferrules were to be subjected to the most severe test they had hitherto been required to withstand. As originally designed the engines were to develop 12,000 horse-power, with an air pressure in the stokeholds equal to 2 in. head of water, which was expected to give the ship a speed of 20 knots per hour.

"A preliminary run was made on Friday, the 10th inst., to test the adjustments of the machinery, and to see that all was in working order, a necessary precaution seeing that the ship has been laid up in reserve for a period of over fifteen months. The Vulcan left the dockyard jetty at nine a.m., and by ten o'clock was so far clear of the harbour as to allow of 'full speed' being ordered. The air fans were adjusted to give a pressure of 1·5 in. of water in the stokeholds, and at 10.20 the engines were developing upwards of 11,800 horse-power, with 98½ revolutions. It was not considered advisable to open out too suddenly, considering the length of time the ship had been laid up, and consequently the engines were kept at about this power for the first half-hour of the trial. The speed of the air fans was then increased until a pressure of over 2 in. of water was steadily maintained in the stokeholds, the revolutions of the engines gradually increasing as the steam pressure went up, until at the end of the first hour 102 was attained, the horse-power developed being 12,550. From this time to the end of the four hours' trial the working of the machinery and boilers was all that could be desired, the steam being steadily maintained, the engines working smoothly, and the required power obtained by slight alterations in the speed of the air fans, the ultimate result of the four hours' run being 12,032 horse-power, 99·6 revolutions, 1·8 inches air pressure in the stokeholds, mean pressure of steam in boilers 148 lb., 26·5 inches vacuum in the condensers, and the speed of the ship 20·2 knots per hour.

"Subsequent examination of the boilers shows them to be sound and tight, the ferrules being quite uninjured. The grate surface, as now fitted, is 545 sq. ft., and the heating surface 19,160 sq. ft., the power developed being, therefore, 22 horse-power per sq. ft. of grate and ·627 per sq. ft. of heating surface. For purposes of comparison we may take one of the American liners, as, for instance, the steamship Paris, in order to see how these results compare with notable steamships. As altered, the liner is credited with

1026 sq. ft. of fire-grate and 50,265 sq. ft. of heating surface, the horse-power developed being 20,600. This gives 20 horse-power per sq. ft. of grate and ·409 horse-power per sq. ft. of heating surface; in other words, in the Vulcan the indicated horse-power per ton weight of machinery is 12, while in the Paris it is only about 7·7."

Mr. Oldknow dealt last year with the successful employment of ferrules in the case of the Thunderer.

Torpedo-gunboats.

The torpedo-gunboats are by far the least satisfactory of the vessels building under the Naval Defence Act. This class has gradually grown from the Sharpshooter of 735 tons into the Alarm of 810 tons, and the five vessels of the Dryad class of 1070 tons. Originally intended to steam 21 knots with 4500 horse-power, we have had to be content with 3500 indicated horse-power and a speed of 19 to 19½ knots for the Alarm class, with the exception of the Speedy, which is fitted with water-tube boilers, and only 19 knots is anticipated for the Dryad class. Particulars of the trials of some of the Alarm class are given below:—

Name.	Air pressure.		Horse-power.		Speed in knots by log.	
	Natural Draught.	Forced Draught.	Natural Draught.	Forced Draught.	Natural Draught.	Forced Draught.
Alarm	·8 in.	2·48 in.	2593	3886	18	19·2
Antelope	·55 ,,	1·35 ,,	2630	3621	17	19*
Jason	·93 ,,	2·1 ,,	2676	3552	19	20
Jaseur	·9 ,,	2·75 ,,	2546	3711	18	19
Leda	·8 ,,	2·2 ,,	2691	3601	17·75	18·3
Niger	·8 ,,	2·2 ,,	2710	3784	17·5	19·3
Onyx	·88 ,,	2·1 ,,	2526	3546	17·5	19
Speedy	·57 ,,	1·7 ,,	3046	4703	18·5	20·2

* The trials of the Antelope took place in a heavy sea.

These performances would not be altogether unsatisfactory if they had been borne out by experience on active service. This is, however, far from being the case. Those which were commissioned for the naval manœuvres were, Mr. Thursfield states, quite unable to maintain a speed at all approaching their trial speed, and were constantly breaking down. In one respect they have been eminently satisfactory: they have proved themselves good sea boats. The Speedwell has been over two years in commission in the Channel Squadron, and the Gleaner was able to continue her voyage after the gale which necessitated the return of the Resolution to Queenstown.

Water-tube boilers.

Defective boilers have been the cause of the failure of these vessels. The Sharpshooter, which has given her name to the class, has been fitted with new tubulous boilers made by Messrs. Belleville, of St. Denis, France. The advantages claimed for the water-tube boilers over

those of the ordinary type are :—1. That higher working pressures can be obtained than are practicable with ordinary boilers. 2. That they are economical to maintain. 3. That they are less liable than ordinary boilers to derangement or damage through accident or neglect; and also that, even in case of rupture, the damage which would result would be much less than with ordinary boilers, owing to the much less quantity of water they contain. 4. That they are light and occupy less room. 5. Steam can be raised with great rapidity, not more than half an hour being necessary. 6. Freedom from furring or scale. The new cruisers Terrible and Powerful are to be fitted with boilers of the Belleville type, which will be made in England. Messrs. Maudslay, Sons and Field are the agents and manufacturers of the Belleville boiler in this country.

We now turn to new construction.

New construction. Torpedo-boat destroyers.

During the early part of last year there was a considerable agitation in the newspapers with regard to the deficiencies of the British Navy in torpedo-boats. France was making great strides in torpedo-boat construction. Speeds of 23, 24, and 25 knots were being obtained; even the latter has since been exceeded, and Mr. Normand hopes shortly to obtain a speed of 30 knots. The Admiralty refused to yield to the outcry for laying down torpedo-boats for the British Navy. The torpedo-boat is the weapon of the weaker naval power; and it was determined to meet the torpedo-boat construction in other countries by building vessels fast enough to catch, and powerful enough to destroy, foreign torpedo-boats, which yet should not be too large or too costly to admit of providing them in sufficient numbers for the task which they were intended to perform. To this policy we owe the so-called torpedo-boat destroyer, twenty of which appeared in the naval programme of last year. This valuable class are of 220 tons displacement, and with 3400 indicated horse-power, are estimated to steam 27 knots. They are propelled by twin screws. The armament consists of one 12-pounder quick-firing gun, mounted amidships forward, and three 6-pounders, two forward and one aft, provision being also made for mounting two more on the broadside. They are fitted with five torpedo-tubes, have a complement of forty men, and carry 60 tons of coal. They will cost about £30,000 a-piece. A correspondent of the *Engineer* says :—"The disadvantages of this class of vessel are common to all torpedo-boats and torpedo-catchers—the upper part of the inverted cylinders, three on each side, being nearly flush with the upper deck, are dreadfully exposed to projectiles from quick-firing guns. The size of the circular hatches prevents more than one man passing through them at the same time, and they must be duplicated,

or, in case of a collision or sudden foundering, half the crew below will not be able to reach the deck. The conning-tower is small, and the view therefrom is interrupted by the capstan on top of the turtle back." Particulars of the trials of these vessels are given on page 14 by Mr. Oldknow.

Torpedo-boat destroyers.

The orders for the 42 torpedo-boat destroyers of the Havock class, including those already completed, have been given out among 14 different firms as follows:—Messrs. Yarrow, the Havock, Hornet, Hasty, Dasher, and Charger. Messrs. Thornycroft, the Daring, Decoy, Boxer, Ardent, and Bruiser. Messrs. Laird, the Ferret, Lynx, and three unnamed. Messrs. Palmer, the Janus, Porcupine, and Lightning. Messrs. Thomson, the Rocket, Surly and Shark. Messrs. White, the Teazer, Conflict, and Wizard. Messrs. Doxford, of Sunderland, the Haughty and Hardy. Messrs. Hanna, Donald and Wilson, of Paisley, the Fervent and Zephyr. The Barrow Company, three unnamed. Messrs. Hawthorn, Leslie and Co., three. Messrs. Armstrong and Co., two. Earle's Shipbuilding Company, two. The Fairfield Shipbuilding Company, three. The Thames Ironworks, one.

Ten first-class torpedo-boats are well in hand, and will be completed in 1894–5.

Renown.

The Renown was laid down in the early part of 1893.* She is under construction at Pembroke. The following table gives her particulars compared with those of important Russian and French ships:—

Particulars.	Renown.	Three Saints.	St. Louis & Charlemagne.
Displacement, tons	12,350	12,480	11,232
I.H.P., maximum	12,000	10,600	14,000
Length	380 ft.	357 ft. 6 in.	385 ft. 6 in.
Beam	72 ft.	72 ft. 2 in.	66 ft. 7 in.
Draught	26 ft. 9 in.	27 ft.	25 ft. 10 in.
Speed, knots	18	16	17 to 18
Coal capacity, tons	800	1,000	—
Endurance at 10 knots	—	4,000	—
Side armour belt . . inches	—	18 to 16	15¾
Side armour, upper works ,,	—	5	3¾
Armour turret ,,	—	12	15¾
Protective deck ,,	—	—	3½
Armament	4 10-in. 29 ton. 10 6-in. Q. F. 8 12-pr. ,, 12 3-pr. ,, 8 M.	4 12-in. 12 6-in. Q.F. 4 4·7-in. ,, 16 smaller ,, —	4 11·8 in. 10 5·5-in. Q.F. 6 3·9 in. ,, 36 47-mm. & 37-mm. Q.F.

Ships laid down. Majestic and Magnificent.

Provision was made in the Navy Estimates for 1893–4 for the commencement of the Majestic and Magnificent to the extent of £81,900 and £179,509 respectively. The Majestic was not commenced at Portsmouth till November, and the Magnificent was laid

* It is expected that she will be ready for launching at the end of the current year.

down at Chatham in December. 250 tons of material were, it is said, put into the former in the first week, and good progress has since been made. Early in March most of the frames were already in place to the height of the armoured deck. Some of the bulkheads in the fore part of the ship were also in place.

The following description of these two first-class battleships has been issued as a Parliamentary Paper:—Their proposed dimensions are: Length, 390 ft.; extreme breadth, 75 ft.; mean draught, 27½ ft.; displacement, 14,900 tons. With natural draught, on the eight hours' contractors' trial, a mean speed of 16½ knots is anticipated; with moderate forced draught a maximum speed of 17½ knots will be obtained. The armament will include four 12-in. breechloading guns of new type mounted in pairs; twelve 6-in. quick-firers; sixteen 12-pounders, quick-firers, new type; and twelve 3-pounders, quick-firers. There will also be five torpedo discharges for 18-inch torpedoes, four of these being submerged. In the general disposition of the armament the arrangements of the Royal Sovereign class have been followed. There are, however, certain important differences. The 12-inch guns, mounted in strongly armoured barbettes, will have their mountings so arranged that they can be loaded in any position by manual power, while the proved advantages obtainable with hydraulic power and fixed loading stations will be retained. Strong armoured shields will also be fitted to the turntables and revolve with the guns. The protection of the 6-inch quick-firing guns is to be carried out more thoroughly than in the Royal Sovereign class, involving considerable additional weight. Two more 6-inch quick-firers are carried in the new ships, and 12-pounders have been adopted instead of 6-pounders, as in the Royal Sovereign.

Powerful and Terrible.

The U.S. Institution Journal for February says:—"The contracts for building the new first-class cruisers Powerful and Terrible have been placed with the Naval Construction and Armament Company at Barrow and Messrs. J. and G. Thomson of Glasgow respectively. The cost of the hull of these ships is £338,000 and £345,000 respectively, in addition to £100,000 for the machinery of each. The time for completion is three years. Orders have been given that the work of building the Powerful is to be begun at once, and by March the 31st the sum of £57,544 will have been spent on her construction. The Terrible will not be begun until the beginning of the next financial year."

A Parliamentary Paper gives the following description of these ships:—"The designs for the two first-class cruisers, Powerful and Terrible, for which provision is made in the Navy Estimates for

1893–4, have not yet been completed, and the dimensions must therefore be considered as still open to some modification." The principal dimensions as now settled are as follows: Length, 500 ft.; breadth, 71 ft.; mean draught with keel, about 27 ft.; displacement, about 14,200 tons. "The continuous sea speed, for smooth water steaming, and with a clean bottom, is to be 20 knots. On an eight hours' natural draught contractors' trial the speed will be about 22 knots. The steel hull will be wood sheathed and coppered, so that the vessels may keep the sea for long periods without serious loss of speed. A coal-bunker capacity for about 3000 tons will be provided, and, at the above-stated draught and displacement, about half that weight will be carried. The armament will include two 9·2-in. guns mounted as bow and stern chase, twelve 6-in. quick-firers (four of which will be capable of firing right ahead and four others right astern), eighteen 12-pounder quick-firers, twelve 3-pounders, besides smaller machine guns. Armour protection will be provided for all the 9·2-in. and 6-in. guns, and the 12-pounder guns on the upper deck will be furnished with strong shields revolving with the guns. The torpedo armament includes four submerged torpedo dischargers placed in two separate rooms. The engines, boilers, magazines, and other vital portions of the ship will be placed below a strong curved steel deck, having a thickness of four inches for a large proportion of the length, with a slight reduction of thickness towards the extremities. This deck will be associated with minutely subdivided coal bunkers extending up to the height of the main deck, these features of protection being identical with those which have been adopted for other first-class cruisers of the Royal Navy. Most careful study has been bestowed upon all matters relating to the protection of the armament and the guns' crews and the transport of the ammunition from the magazines to the fighting positions of the guns. An armoured conning tower placed at the after end of the forecastle will give protection in action to the commanding officer. A great height of freeboard has been provided in association with a long poop and forecastle, upon which the bow and stern chase guns will be carried. This will secure not merely the power of fighting the guns in heavy weather, but also that of maintaining the speed at sea. In order to secure the sea-speed above mentioned, it has been necessary to provide for engines and boilers capable of developing a very large horse-power. After full consideration, it has been decided to adhere to twin screws and not to adopt triple screws, experience in the Blake and the Blenheim, as well as in the large twin-screw steamers of the mercantile marine, having established the complete efficiency of such propellers within the limits of power and draught contem-

plated. It has been decided to postpone the commencement of the Terrible until the next financial year, but tenders will be invited for the construction of the Powerful as soon as the designs have been completed. This course has been resolved upon in association with an arrangement to advance during the current financial year, somewhat more rapidly than was first intended, the construction of the fourteen new torpedo-boat destroyers provided for in the programme."

Second-class cruisers. Eclipse, Minerva, Talbot.

The Eclipse and her sister vessels are a very considerable advance upon the other cruisers of second-class type. Their principal dimensions are: Displacement, 5500 tons; length, 350 ft.; beam, 53 ft. With 9000 indicated horse-power the estimated speed is 19·5 knots. The armament includes five 6-in. and six 4·7-in., besides smaller quick-firing guns. "They have an armoured deck shaped like that of the Vulcan, with a curve so deep as to extend down far over the sides, thus protecting a vertical streak of some seven or eight feet in width. The angle which this armoured deck makes with the side plating is about 45 degrees, hence the 2½ in. plates with which it is covered present a horizontal thickness of 3½ in. of steel to the fire of the enemy. Thus the difference in displacement between the 5500 tons of the Eclipse and the 4360 tons of the Astræa—viz., 1140 tons—is not only distributed over the longer and broader hull, but has given an extra thickness of nearly three-quarters of an inch diagonally through the steel armour—a very important consideration indeed. The French cruisers of corresponding type have a protective depth of 2⅜ of an inch in thickness. The inner skin of the Eclipse is also brought very much further forward and aft, and the strength of the framing has been materially improved."—*Army and Navy Gazette.* These ships are making good progress. The Eclipse is already framed and plated as high as the main deck.

Torch. Alert.

In addition to the above, two sloops of 960 tons displacement have been laid down at Sheerness. They will have a length of 180 ft., 32 ft. 6-in. beam, a mean load draught of 11 ft. 6-in. The engines will develop 1400 horse-power under forced draught, and 1050 horse-power under natural draught, imparting a speed of 13·25 knots, and 12·25 knots respectively. Their armament will be wholly on the quick-firing principle, each carrying six 4-in. guns and four 3-pounders. They carry 130 tons of coal. Necessary, perhaps, for the police of the seas in peace time, they do not add much to the fighting strength of the Navy.

New Programme.

For details of the new programme we must refer our readers to the First Lord's Memorandum in Part IV. It includes seven battleships of the Majestic type, and six second-class cruisers of the Talbot type.

Mr. Oldknow, to whom we were unable to allot the same space as last year, has kindly supplied the following brief notes on Naval Engineering.

NAVAL ENGINEERING NOTES.

A very long period has elapsed since engineering changes have been introduced into the Royal Navy of an importance equal to those that have made their appearance during the past twelve months. The introduction, and probably the eventual universal adoption, of the water-tube form of boiler is of itself a sufficiently startling innovation. It is doubtful if one has been made of equal significance since the general use of surface condensers came into fashion. Many attempts have been made in former years to advocate the employment of water-tube boilers in the Navy, but they were coldly looked upon, and it is only to-day that Thornycroft, Yarrow, Normand, White, Babcock, and Blechynden are all engaged in the construction of water-tube boilers of all kinds for use in torpedo-boat destroyers, each hoping to succeed in getting a tenth of a knot more speed than his rivals.

Trials of Havock and Hornet.

Without going far afield for information, I think a comparison of the performances of Messrs. Yarrow's two boats, the Havock and Hornet, will put us at least abreast of the present condition of the question. These boats are exactly alike in all respects, except that the Havock is fitted with the locomotive type boilers and the Hornet is supplied with Messrs. Yarrow's water-tube variety, which results in the latter boat carrying four funnels instead of two. This is the only difference in their appearance. They are 180 ft. long by 18 ft. 6 in. beam, and in outward form very much resemble the first-class sea-going torpedo-boats built by the same firm. The coal-carrying capacity of the Havock is 60 tons, which is placed in bunkers along each side of the boiler compartments, and is estimated to be sufficient for a run of 4000 miles at ten-knot speed, which speed, however, is too low to be often maintained. The complement of officers and men to man this vessel is 42, for whom there is sufficient but not luxurious accommodation. The total cost of the Havock is £34,254, of which her machinery absorbs £18,674. With a dead weight on board of 35 tons, under exceptionally trying conditions of weather, the speed on the three hours' run was over 26 knots. On the runs on the mile the mean revolutions were 362 per minute, and the approximate indicated horse-power was 3500. The final mean of the speed was 26·783 knots, and certainly might have been rather higher, as the steam pressure was only 165 lb. instead of 180 lb. on the square inch. Messrs. Yarrow them-

selves said, "The entire absence of all vertical vibration was a noticeable feature in the trip, the movement of the boat being quite different from what is usually experienced when trying vessels furnished with abnormal power, and, in fact, the vibration was much less than is found in some of our latest additions to our Atlantic passenger steamers." It is evident from this that the firm were satisfied with their performance then. However, on the 23rd of February the Hornet was put through a course of trials, out of which she came triumphantly as the fastest vessel afloat in the world, making 28 knots, which is rather more than 32 statute miles. This enormous speed is at least a knot higher than any other of which there is a record, and was obtained from engines of the ordinary tri-compound torpedo-boat type, precisely similar in every respect to those fitted in the Havock, but of superior efficacy in consequence of the application of the Yarrow boilers, which actually weigh 11 tons less than do the Havock's, in itself an important advantage. It has been found on test that a single one of the Hornet's boilers will evaporate 12,500 lb. of water per hour. There are altogether eight boilers, arranged in two stokeholds in two groups of four. In twenty minutes after lighting fires there was steam, and the vessel proceeded down the river. By the time the posts which mark the mile on the Maplin Sands were reached, the engines had worked up to the necessary power, and the speed trials were begun without delay, and that there was no lack of boiler power was demonstrated by the violence with which the safety-valves were blowing. There was no more vibration than in the case of the Havock, a result undoubtedly due to the system of balancing the engines, on which Mr. Yarrow read a paper two or three years ago before the Institute of Naval Architects. The feed arrangements have always been looked upon as a probable source of difficulty in water-tube boilers arranged in groups, but judging by the trial under notice, the difficulty, if it ever existed, has been most successfully surmounted. The Hornet is not likely long to retain her proud pre-eminence of speed. M. Normand and Co. are now building at Havre a seagoing torpedo-boat, the Forban, from which they hope to obtain a speed of 30 knots, and for some time back Mr. Yarrow has been offering to do the same thing for any Power willing to pay for it. Probably before the next appearance of the *Naval Annual* takes place a considerably higher speed than that of the Hornet will have been achieved.

The Centurion, which was originally designed as a second-class battleship, is now, at the moment of writing, on her way to take up her position as a first-class battleship to fly the flag of the commander-in-chief on the China station. On the 6th October, with Centurion.

little wind and no sea, she attained an average deep-sea speed of 18·51 knots, which, though believed to be below her actual performance, is the greatest speed hitherto attained by an ironclad. The general behaviour of the Centurion will be watched by many people in England with the keenest interest, who believe we possess in her almost the *ne plus ultra* of a fighting machine, the addition of three examples of which to his fleet, instead of two Royal Sovereigns, costing about the same money, any British Admiral would welcome with joy. This, however, is not my business, but the Greenock Foundry Company are to be congratulated on the excellence of their machinery.

Improvement in machinery supplied to Navy.

Here I may remark on the general improvement that has taken place of late years in the character of the engines—and, very lately, the boilers—supplied to the ships of the Royal Navy. Breakdowns are, happily, becoming rarer every day. In our battleships they are practically unknown. One tires of reading the accounts of the invariably successful trials of such makers as Messrs. Humphrys and Messrs. Maudslay. Not that the results of all trials of battleships are exactly alike. In the case of the eight battleships constructed under the Naval Defence Act, the speed varies from 18·27 with forced draught, in the case of the Royal Oak, to 16·9 in the Hood. But there are many circumstances to be taken into consideration, first among them being the difference of the load draught in different ships when on trial. This, however, cannot explain the fact that the Barfleur, with a displacement of nearly 1000 tons less than the Centurion, only attained a speed inferior by a knot to her sister-ship. Of course we all understand that trial trips, as a gauge of what ships will do when in commission, are nearly valueless. They are only important as showing the relative speeds of different vessels, and to make the records of trials useful in this light extreme care must be taken as to their accuracy. Perfect correctness is obviously impossible, but a greater degree of it than obtains at present is certainly possible.

Induced draught.

Another quite new proposal, that of Mr. Martin, for the substitution of "induced" for "forced draught," has made unexpected progress since the last *Annual* appeared. It had then had merely some preparatory, and not altogether satisfactory, trials in the Gossamer gunboat, which were carried out in the basin at Chatham. Since then the system has been subjected to the most crucial test of experiments, and there seems to be but little doubt that it will be largely adopted in the Navy. The idea is to suck air through the boiler tubes instead of forcibly pumping it. Next year there will probably be more to say on this subject.

A few words about the engineering *personnel* of the Royal Navy. While the horse-power of the engines of the Navy has been so enormously increased of late years, the Admiralty have shown no sign that they recognise the necessity of increasing *pari passu* the number of their mechanical officers, which remains much the same as what it was five years ago, before the addition of so many thousands of tons of the most powerful and intricate machinery in the world. This anomaly attracted the attention of marine engineers outside the Navy, and on 5th May of last year Sir James Kitson, and Messrs. John Penn, W. Mather, William Allan, and G. Wolff, all members of Parliament and all engineers, addressed a letter of remonstrance to the First Lord of the Admiralty on the attenuated condition of engine-room complements in the Service. Mr. John Penn, in a letter to the *Times* of 25th November, points out that in 1882 the indicated horse-power of the Navy was about 500,000, and there were then 700 engineer officers ; it is now 1,500,000, and there are 750 officers—that is, at the former date there was one engineer for 700 horse-power, while now there is one engineer for 2000 horse-power. Engineering *personnel.*

PERSONNEL.

In former numbers of the *Naval Annual* considerable space has been devoted to pointing out the deficiencies in the *personnel* of the Navy. The compiler wrote last year : " Our forces are still far short of our requirements, especially in engineers, artificers, and engine-room requirements." It is gratifying to note that this important subject has received the most serious attention from the present Board of Admiralty. The numbers to be voted this year are 83,000, as compared with 76,700 in 1893–4 and 74,100 in 1892–3. The increase in 1894–5 is mainly due to the addition of 2553 seamen, 2805 engine-room ratings, and 500 Royal Marines.

CHAPTER II.

The Progress of Foreign Navies.

Dimensions. There is little of importance to record in the history of the Navies of the world during the past year. The leading Maritime Powers continue to build battleships and cruisers, torpedo catchers and torpedo boats. Submarine boats are still rather examples of inventive skill than weapons fit for actual warfare. While England holds the lead in large dimensions, with the armour-clads of the Royal Sovereign Class of 14,150 tons, and with the Majestic and Magnificent of 14,900 tons, which she is now building, the other Powers limit the dimensions of their ships for the line of battle to from 10,000 to 12,000 tons. To cruisers the same remark applies. The Powerful and Terrible will be larger and more powerful than the Russian Ruriks, the American Columbias, or the French D'Entrecasteaux. It should be noted that even for the smaller classes there is a general tendency to increase dimensions. A re-action has set in against the doctrine which laid down too absolutely that the best ship of war is that which contains the greatest power on the smallest displacement. For this doctrine to be unassailable it would be necessary to say "the greatest power practicable." It is owing to the fact that the limitation to the doctrine has been forgotten that so many ships of every kind—especially cruisers and torpedo boats—are continually in dockyard hands for repairs. At the present time the re-action is complete, and though in the universal endeavour to build fast vessels, of good speed on active service, that is to say, of good speed with natural draught, more breathing room and more space are now given to the boilers and machinery, the ship of war still remains a fearfully complicated machine.

Speed. For battleships a speed on the measured mile of about 18 knots is accepted, for cruisers it ranges from 20 to 22 knots; for torpedo catchers it is greater, 27 knots in the Havock class, though they are under 220 tons, while Normand hopes to attain a speed of 30 knots with a simple sea-going torpedo boat. The progress in the smaller types is due to the employment of high pressures combined with light and superior construction and excellent arrangement of the machinery. Aluminium has been used in the construction of several

torpedo boats. Yarrow is building a vedette boat entirely of this metal for the French Navy.

The boiler question has also made some progress, water tube boilers with continuous circulation being now in favour. They were adopted first for small vessels, and subsequently for the larger ships of war. In France the Allest boilers and Belleville steam generators have been used for the large majority of new ships. Boilers of the Temple-Normand type and of types on the same system are being put into torpedo boats; while in England the Yarrow and Thornycroft boilers have given good results, and several types of French boilers are being tried. Turning from boilers to the question of fuel, we observe a marked tendency to partially substitute petroleum for coal. Some experts, though taking into account the waste of fuel, believe that the use of petroleum doubles the ship's radius of action, the capacity of the bunkers being equal. Others reduce the advantage gained to from 60 or 70 per cent. Everyone is agreed that the employment of liquid fuel will have the great advantage of reducing the engine-room staff and of enormously facilitating the work of stoking. Whether used alone or with coal, the advantages of petroleum are indisputable. In any case it affords a most simple means of forcing the fires if it should not be considered desirable to abandon the use of coal as the principal source of power. The Italian Navy is putting into every ship petroleum burners, invented by the engineer Cuniberti; the same system is in use in the German Navy, and is said to have just been adopted by other Admiralties. In France experiments have been made with various systems, which have given such satisfactory results as to justify the belief that several ships will be fitted to carry a good petroleum supply. Boilers and liquid fuel.

Weapons of destruction have made so much progress in the last few years that every one appears satisfied, for the time being, with the stage just surmounted. Though we may be contented with initial velocities of about 2600 ft., experiment has shown that by increasing the length of the gun and by using smokeless powder, it will be possible to further increase the ballistic power. French artillerists have attained the hitherto unheard-of velocity of nearly 4000 ft. with a 16-cm. 90 calibre gun, in the construction of which three screw tubes have been used. The gun will soon again occupy the relative position with regard to armour which it lately held. Guns.

Krupp has produced nickel steel of an extreme resistance. In England and the United States the manufacture of guns of steel wire has been undertaken. Armstrong has produced a quick-firing gun of 8-in. calibre. There have been gun accidents in several Navies, but whatever progress is made there must always be such

accidents. They were not unknown with the simple old smooth-bore gun; it is not astonishing that they take place to-day, with the infinitely more powerful and more complicated weapons with which ships are now being armed. We must not omit to mention that the Maxim 37-mm. gun has definitely taken its place amongst the naval artillery of the various Powers. An eye-witness of experiments with this terrible weapon has said : "Elle lance une pluie de fer."

Armour.

Turning to armour, very great advances have been made owing to the process of welding and hardening invented by Harvey. At Gavre some interesting experiments have been made on hardened steel armour of slight thickness, treated by the Harvey process, or by analogous processes invented by French metallurgists. In each case qualities have been shown, which prove that the new processes considerably increase the power of resistance. Trials were also made with the English Vickers' plates and with the French plates of Saint Chamond and of Creusot. Plates of medium thickness have been attacked by projectiles of a diameter equal to their thickness and at velocities up to 2300 ft. per second. Although they have been pierced through under these conditions, they have shown remarkable powers of resistance. Artillerists consider that nickel-steel plates treated by any of the processes based on the Harvey system have, as compared with ordinary nickel-steel plates, a power of resistance as 1·5 is to 1. It must not be forgotten that this method of manufacture has no more than any other, as yet, said its last word. It is well to observe here that the increase in the resisting power of armour is of the greatest importance in the designing of ships, for, thanks to it, the protection can be increased without increasing the thickness of the plates, or the weight of armour can be reduced while giving the same amount of protection. The new Harveyed steel costs more than nickel steel, and as the latter was already more expensive than steel or compound armour (now completely given up), the protection of a ship will be as costly, if not more so, than before. This, however, is a very secondary consideration for the great Navies of the world.

Naval Events of 1893.

Amongst the events of the year affecting Foreign Navies, the great Naval Review at New York and the visit of the Russian Squadron to Toulon have attracted most attention. From a strictly military point of view, the events of interest are : the action of Paknam, between the French gun vessel Inconstant and the gun boat Comète on the one side, and the Siamese forts on the other; the engagement between the Argentine armour-clad Independencia and the rebel coast-defence vessel Andes, which was terminated by the abandonment of the latter by her crew; and the intermittent bombardment of Rio de Janeiro by

the revolted Brazilian Navy under the command of Admirals de Mello and Saldanha de Gama. The civil war in Brazil shows that without a landing force a fleet is capable of doing damage, but is quite unable to take possession of a territory. In Brazil the insurgent fleet had the command of the sea, but was unable to take possession of the capital, which is an admirable maritime position.

With these general remarks I turn to a review of the progress of Foreign Navies. The following order has been adopted: France, Italy, Germany, Russia, and the United States. Having dealt with the more important Navies, I will say a few words with regard to the Navies of the second rank, but I must first observe that, in the case of some of the latter, shipbuilding is completely at a standstill. The financial situation of several, with bankruptcy staring them in the face, prevents them from either building new ships or keeping in order the costly vessels which they have acquired in the last few years. But if my task is in this respect an easy one, it is by no means the same when we have under consideration the naval progress of nations whose credit is solid and whose finances are sound. All are building, all are increasing their fleets. Every Navy is watching the progress and programmes of other countries. One builds because the other builds, the one increases its force both in commission and in reserve because the other is doing the same. We are revolving in a vicious circle from which escape appears difficult.

France.

The French Admiralty is still carrying out the programme of construction which was adopted in 1891, and whatever may have been said to the contrary, the object in view was rather to replace the somewhat numerous wooden vessels which are still to be found in the Navy than to increase the numerical strength of the fleet. By the year 1900 all wooden vessels will have been struck off the list, and numerically the French Navy will be no stronger than it is to-day; but if official declarations were to be believed, the Estimates are now within a few millions of francs of their highest point. It cannot, however, be disputed that both the private yards and the Government dockyards are actively employed. The number of ships completing afloat and about to go through their trials is larger than it has ever been before. What follows is the proof of this assertion. We will take first the ships launched, then the ships laid down, and lastly the trials and vessels completed for sea.

Ships launched.

Two first-class battleships, one second-class battleship, one armoured cruiser, five second-class cruisers, one third-class cruiser,

a torpedo cruiser, a torpedo gunboat, and several torpedo boats of different classes have been launched.

Charles Martel.

The first-class battleship, Charles Martel, was launched at Brest on the 29th August. The principal dimensions are as follows: Length over all, 392 ft. 6 in.; beam, 71 ft.; draught of water aft, 27 ft. 6 in.; displacement, 11,882 tons. The horse-power is to be 13,500 with forced draught and 9700 with natural draught; the corresponding speeds being 17·5 to 18 and 17 knots. The engines are of the compound vertical type, with three cylinders. They are driven by 24 Lagrafelle and d'Allest boilers.

The Charles Martel is protected by a complete armour-belt at the water-line, the thickness of which varies from 17¾ inches amidships to 13¾ inches forward and 12¼ inches aft. Above the main belt another belt has been fitted, of 4 inches in thickness and 4 feet in depth, intended to protect the armoured deck against the direct action of powerful explosives. This armour is called a cofferdam belt. An armoured deck of 3½ inches in thickness extends the whole length of the ship. The principal armament is disposed in the form of a lozenge in four revolving turrets, protected by 15¾ inches of steel armour. The forward and after turrets are each armed with 30-cm. (11·8-inch) guns; the starboard and port turrets with 27-cm. (10·6-inch) guns. Between the principal turrets eight smaller turrets are distributed, each protected by 4 inches of hardened steel and armed with a 14-cm. (5½-inch) quick-firing gun. The armament is so arranged that seven guns can fire ahead or abeam. The guns are remarkable for great length of chase and for high initial velocities, which approach 2600 feet. The lighter guns are distributed on a superstructure and in military tops. At first they were intended to be 24 in number, and to comprise 65-mm., 47-mm., and 37-mm. guns, but a certain number of these are to be replaced by Maxim guns.

The Charles Martel has the high bow of the French ironclads, but the after-part of the ship is low. The stem is straight, with a short projecting ram. The vessel has two military masts and two funnels. The armament is mounted in commanding positions, the bow gun being 29 ft. 6 in. above the water-line, as compared with 23 ft. in the Royal Sovereign class and 17 ft. in the Hood. The armour will weigh 4560 tons, or more than one-third of the total weight of the ship.

This vessel is one of the last French ironclads in which the principal armament is distributed in four turrets, the new designs being based on the English system of mounting the larger guns in pairs in two turrets, at the bow and the stern. This arrangement has been adopted in order to reduce the tonnage, and to render it

possible to mount numerous guns of moderate calibre in the space between the two turrets. The Charles Martel is the largest ship ever built in the French state dockyards.

The Jauréguiberry was launched during the Franco-Russian *fêtes* in the presence of President Carnot. She was built at La Seyne by the Forges et Chantiers de la Méditerranée. Her dimensions are as follows: length, 356 ft.; beam, 72 ft. 8 in.; draught of water aft, 27 ft. 9 in.; displacement, 11,818 tons. The indicated horse-power is to be 13,275. Speed with natural draught, 17 knots. The speed with moderate forced draught has not been provided for in the contract, but it will approach 18 knots. The armament will be as follows: two 30-cm. (11·8-in.) and two 27-cm. (10·6-in.) guns in revolving turrets, the two former mounted forward and aft, the two latter on the broadside; eight 14-cm. (5½-in.) quick-firing guns, mounted in pairs in four turrets, which are placed two a little below and abaft the bow gun, and two forward of the stern gun. The 14-cm. guns of each turret have a common magazine, and their ammunition is brought up to the breech by a very powerful ammunition-hoist. The projectile, on leaving the magazine, is raised mechanically, and is placed by the same means on a tray, which, by a horizontal movement, presents it at the breech in the loading position. The ammunition-hoist feeds the gun rapidly, and can be worked either by electricity or by hand. Besides the foregoing armament, the Jauréguiberry will carry four 65-mm., twelve 47-mm., and eight 37-mm. quick-firing guns, as well as six torpedo launching tubes. It is probable that several of these will be replaced by Maxim guns. Jauréguiberry.

Protection is afforded by an armoured belt, which extends from end to end, and the thickness of which varies from 11 in. at the ends to 17¾ in. amidships; by an armoured deck 2¾ in. in thickness; and by a coffer-dam covered with 4-in. armour. The turrets for the big guns are protected by 14½-in. armour, those of the 14-cm. guns by 4-in. armour. The vessel has two military masts, each with two tops. She is fitted with an ordinary, not a balanced, rudder.

The engines of the Jauréguiberry will be of the compound vertical type, with three cylinders, and will be driven by twenty-four Lagrafelle and d'Allest boilers, tested to a pressure of 15 kilos. The cost of the vessel will be very nearly £1,080,000.

The Jauréguiberry was designed by M. Lagane, the designer of the Pelayo and the Capitano Prat. She is in fact an enlarged Capitano Prat. The principal points which distinguish her from the other battleships building for the French Navy are the following:—the introduction of balanced turrets, with an unvarying centre of gravity, whatever may be the position of the gun; the power of working the

armament and turrets either by electricity or by hand; and the complete absence of hydraulic machinery on board, for working either the smaller or larger turrets. In conclusion, the ship does not possess the enormous superstructures to be found in the French ironclads which preceded her—the Hoche, Neptune, and Magenta—which appear to most sailors to be a source of danger to the ship and an illusory protection.

Tréhouart.

The Tréhouart, a sister of the Bouvines, is completing afloat at La Seyne. Length, 284 ft.; beam, 58 ft. 8 in.; draught of water, 22 ft.; displacement, 6610 tons. Two engines of 8400 horse-power, driven by 16 multitubular boilers, are to give the ship a speed of 17 knots. The Tréhouart is protected by a belt at the water-line, the thickness of which varies from 17¾ in. to 10 in.; by an armoured deck of from 4 in. to 2¾ in. in thickness; by 12 principal water-tight bulkheads, and by numerous small sub-divisions.

The armament will consist of two 30-cm. (11·8-inch) guns, placed forward and aft in revolving turrets, protected by 14½ in. of steel in the movable part, and 12·6 in. of steel on the base; eight 10-cm. quick-firing guns; ten 37-mm. revolver guns, and four torpedo-launching tubes.

The Tréhouart and the Bouvines belong to a group of small ironclads, which in the first instance were to be constructed on the same design, that of a modified Furieux type. But low-freeboard is not in good odour in the French Navy; and, owing to the criticisms which were made at the moment of the laying-down of the whole group, the Minister of Marine decided to modify the design and armament of the Tréhouart and the Bouvines. The hull was therefore raised forward, and as this alteration entailed increased displacement, which the authorities were not willing to accept, it was necessary to reduce the calibre of the main armament, and to adopt 30-cm. guns in place of the 34-cm. guns of the original design.

Armoured cruisers.

The armoured cruiser Chanzy, of 4745 tons, which has been constructed at Bordeaux, and her sister ships were fully described at page 11 of the *Naval Annual* of 1893. The Chanzy was launched with her masts and machinery in place. She is about to proceed to Rochefort to go through her trials. A sister ship, the Latouche-Tréville, is going through her trials at Cherbourg, the Charner is completing, and the fourth and last of the group, the Bruix, is on the stocks at Rochefort.

Second-class cruisers. Bugeaud class.

Three second-class cruisers were launched in 1893, the Chasseloup-Laubat and the Bugeaud at Cherbourg, and the Friant at Brest. They are built on the plans of M. Lhomme, Assistant Director of Naval Construction. Their principal characteristics are: Length between perpen-

diculars, 308 ft. 6 in.; length over all, 320 ft.; maximum beam, 43 ft. 6 in.; draught of water aft, 21 ft.; displacement, 3722 tons; horse-power, 9000; coal capacity, 600 tons; speed, with natural draught, 18 knots, and with forced draught, 19·25 knots. They are fitted with screws driven by two vertical triple expansion engines. An armoured deck extends from end to end, 2¾ ins. thick amidships, and 4 ins. thick on the slopes. The armament consists of six 16-cm., four 10-cm., eight 47-mm., and twelve 37-mm. quick-firing guns. These cruisers carry six torpedo-launching tubes. The 16-cm. guns are distributed in the following manner: one on the bow, one aft, four in sponsons on the side forming a central group. Forward and aft of the 16-cm. guns of the central group are placed the four 10-cm. guns. This arrangement allows of five guns being fired right ahead or right astern, and six guns on the broadside. The two military masts are fitted with double tops, on which are mounted the 47-mm. and 37-mm. guns. There are three funnels. The Chasseloup-Laubat type is a development of the Davout, or rather of the Suchet type, which is only a lengthened Davout, about which we shall have more to say below.

These three ships were laid down at the end of 1891. The Chasseloup-Laubat is about to go through her trials, the Friant will follow her very closely, but the Bugeaud will not be ready for service until the beginning of 1895.

The second-class cruiser Suchet belongs to an earlier programme than the three cruisers of which we have just been speaking. She has been a very long time on the stocks, her construction having been suspended more than once for financial reasons, and also in order to await the result of the trials of the Davout. The Davout and Suchet were originally intended to be exactly alike, but on the first of these the space allotted to the engines and boilers being insufficient for convenience in working, it was thought wise to increase the length by 19 ft. in the case of the Suchet, though the other dimensions remained unchanged. The principal dimensions of this cruiser are: Length, 318 ft. 3 in.; beam, 43 ft. 6 in.; draught of water aft, 20 ft.; displacement, 3430 tons. The displacement of the Davout is 3027 tons. Suchet.

The propelling machinery consists of two compound horizontal engines which are to develop 5000 horse-power with natural draught, and 9000 horse-power with forced draught. The estimated speed is 20 knots, but it is certain that this will be considerably exceeded.

Protection is afforded by a turtle-back deck, 2⅜ in. maximum thickness, which extends from stem to stern. Armament: four 16-cm., four 10-cm., twelve 47 and 37-mm. quick-firing guns, six 37-mm. revolver-guns, and four torpedo-tubes. The Suchet was

designed by M. de Bussy, formerly Inspector-General of Naval Construction and member of the Academy of Sciences. She is at the present moment going through her trials.

Linois. The third-class cruiser Linois, a modified Surcouf, is building at La Seyne. Displacement, 2270 tons; speed, 19 knots with natural draught, 20 knots with forced draught. Armament, two 10-cm. guns, one on the bow, the other aft, four 14-cm. guns mounted on sponsons, eight 47-mm., four 37-mm., and four revolver-guns and four torpedo-tubes.

Fleurus. The torpedo cruiser Fleurus is sister ship to the Wattignies, which is already in commission in the Mediterranean Fleet. She is of the Condor type slightly modified, with the displacement increased from 1242 to 1310 tons. Her principal characteristics are: Length, 223 ft.; beam, 29·3 ft.; horse-power, 4000; estimated speed, 18 knots. Her coal capacity is 116 tons. The distance traversible at full speed is 500 miles, and at 10 knots about 2000 miles. The design of the Fleurus is by M. de Bussy. She has commenced her trials.

D'Iberville. The torpedo gunboat D'Iberville has been built at St. Nazaire from the designs of M. de Bussy. Her principal dimensions are: Length, 262·6 ft.; beam, 27 ft.; displacement, 925 tons; speed, 21·5 knots; armament, one 10-cm. quick-firing gun forward, one 65-mm. quick-firing gun aft, and four 37-mm. guns. She is fitted with six torpedo-ejectors. This type is intermediate between the Condor and the Wattignies on the one hand, and the Bombe and the Leger, which displace 395 and 425 tons respectively. The D'Iberville is 33 ft. longer than the Wattignies, and her horse-power and speed are very much greater. It is only by the employment of material of exceptional quality, as well as by giving peculiar care to her construction, that her designer reckons on realising his estimates. The D'Iberville is repeated in the Cassini now building at Havre.

Ships laid down. Two first-class battleships, one first-class, four second-class, and one third-class cruisers, one torpedo catcher and a gunboat have been laid down. With the exception of the battleships most of these vessels belong to the programme of 1893, and are hardly begun. The budget of 1894 provides for the laying down of three line-of-battleships, five second-class and one third-class cruiser, one sea-going, five first-class, four second-class, and nine portable torpedo-boats, and one gunboat. Less than £25,000 will be spent on each of the battleships, and with these sums they will only be advanced six hundredths during the year. They are called the Charlemagne, the Saint Louis, and the Henri IV. The two former have been designed by M. Thibeaudier of the Navy, the designs of the third are still under

consideration. She is to be built in a private yard, while the Charlemagne is to be built at Brest, and the Saint Louis at Lorient.

The dimensions of the Charlemagne and St. Louis are as follows: Length, 385 ft. 6 in.; beam, 66 ft. 7 in.; depth of hold amidships, 25 ft. 3 in.; draught of water aft, 27 ft. 6 in.; forward, 24 ft. 3. in.; displacement, 11,232 tons. These ships are to be fitted with three screws, each driven by a vertical triple expansion engine. The horse-power to be developed is fixed at 14,000; the estimated speed is 17 knots with natural and 18 knots with forced draught. Charlemagne and St. Louis.

Protection is afforded by a continuous armoured belt at the water-line, the maximum thickness of which is 15¾ in., and above the belt the neighbourhood of the cofferdam is covered with 3¾-in. plates. Two armoured decks will be fitted; the first will be of 3½-in. armour, and at the level of the upper edge of the water-line belt; the second is 1½ in. in thickness, and will join the lower edge of the belt. The space between the two decks will thus form an enormous "caisson," which will be partly filled with coal.

The armament includes two 30-cm. (11·8-inch) guns mounted forward in a closed turret, which is on the centre line of the ship; two guns of the same calibre aft, mounted also in a turret; eight 14-cm. quick-firing guns in the battery, and two on the upper deck in sponsons, six 10-cm. quick-firing guns on the spar deck, two being mounted forward, two aft, and two amidships; and, lastly, thirty-two 47-mm. and 37-mm. quick-firing guns distributed about the deck and in the military tops. The turrets of the 30-cm. guns are protected by 15¾ in. of steel, the 14-cm. guns in the battery, which are on special mountings with revolving shields, by 3-in. plates of hardened steel. The distribution of the armament permits of two 30-cm., six 14-cm., and four 10-cm. guns being fired right ahead or astern. On the broadside four 30-cm., five 14-cm., and three 10-cm. guns will be available without counting the smaller guns. The principal armament and the turrets can be worked either by hand or electricity.

The armament of the Charlemagne and the St. Louis will be completed by six torpedo-launching tubes, one in each bow, two amidships, two on the quarters. These ironclads will have two military masts, each with two tops and a post of observation for the commander. It will be remarked that the displacement of these vessels is less than that of the Jauréguiberry and the Charles-Martel, before described, and that they have three screws like the Masséna.

The D'Entrecasteaux is building at La Seyne, near Toulon, by the Forges et Chantiers de la Mediterranée, on a design by M. Lagane, the Company's naval constructor. The following table gives the D'Entrecasteaux.

particulars of the D'Entrecasteaux compared with those of the New York, which she much resembles :—

	D'Entrecasteaux.	New York.
Displacement, tons	7960	8150
Length	384 ft. 6 in.	380 ft. 6 in.
Breadth	58 ft. 6 in.	64 ft. 10 in.
Draught	24 ft. 7 in.	23 ft. 3 in.
Indicated horse-power	14,000	16,500
Speed	19 knots	21 knots.
Coal supply	1000 tons.	1290 tons.
Armour on turret	10 in.	10 in.
Protective deck	4 in.	6 in. to 3 in.
Armament	2 9·4-in. 12 14-cm. Q.F. 12 47-mm. „ 4 37-mm. „ 7 torpedo tubes	6 8-in. 12 4 in. Q.F. 8 6-pr. 4 1-pr. 6 torpedo tubes.

The protection consists of an armoured deck with sloping sides, which are four inches thick, and of a second armoured deck above the first. The space between these two decks will be divided into a large number of cellular compartments, in which will be stowed the reserve fuel and stores.

The propelling power will consist of two vertical triple-expansion engines, the boilers of which are arranged in a new style, four being forward of the engines, the fifth abaft them, between the two screw-shafts. The boilers have been tested to a pressure of 10 kilos. Provision has been made for the use of heavy oils for fuel. The speed of the ship is to be 19 knots, with moderate forced draught, burning about 2½ cwt. of coal per square foot of grate. As in the case of the Capitano Prat and the Jauréguiberry, M. Lagane makes use in the D'Entrecasteaux of electric power for all the auxiliary machinery, such as steering gear, the ammunition hoists, and the gear for working the turrets. All the auxiliary machinery is under the shelter of the lower armoured deck. The 24-cm. (9·4 inch) guns will be mounted in turrets, one forward, the other aft, both being protected by a steel shield of 10 ins. in thickness. They are to be on M. Lagane's balanced system. The 14-cm. quick-firing guns are distributed as follows: Four on the spar deck firing ahead and astern, placed amidships and protected by shields of 2¾ ins. of hardened steel, as well as by the side armour; eight in the upper battery, protected like those already mentioned, all being arranged *en échelon*, and therefore capable of firing in a line with the keel. Each of the 14-cm. guns has its own magazine and ammunition hoists. The 47-mm. and 37 mm. guns are distributed on the superstructure and in the tops.

These latter have three platforms. There are two military masts, each with an internal ladderway.

The scantlings of the D'Entrecasteaux will be unusually stout, the weight of the hull being 2942 tons, or 36 per cent. of the displacement. The armour will weigh 644 tons; the armament 475 tons; the engines and boilers 1373 tons. Under normal conditions the ship should carry 650 tons of coal, but with the reserve bunkers in use, this quantity will be raised to nearly 1000 tons, which may be regarded as a large coal endurance. The estimated cost of the D'Entrecasteaux is £620,000. She has only just been laid down. A similar ship, the Jeanne d'Arc, is projected for 1894.

The cruiser Catinat (ex P) is in course of construction at the Chantiers de Graville, near Havre. The principal dimensions and particulars are: Length between perpendiculars, 328 ft. 9 in.; beam, 41 ft. 4 in.; mean draught, 19 ft. 8 in.; displacement, 3998 tons. She has two vertical engines of 7000 horse-power with natural, and 9000 horse-power with forced draught. The speed, with forced draught, is 19 knots. The boilers will be constructed on the Belleville system. Protection is afforded to the ship by an armoured deck, rather over 1 inch in thickness on the horizontal portion, and 1½ inch on the more vertical portion of the slope and 1 inch at the extremities. This armoured deck rests on plating, the thickness of which varies from about ⅜ in. to ½ inch. A cellular belt rises above the armoured deck, above which there will be a splinter-proof deck. An armoured conning-tower will be provided for the captain. The armament consists entirely of quick-firing guns, including four 16-cm., ten 10-cm., fourteen 47-mm., and four 37-mm. guns. There are six torpedo-launching tubes. The 16-cm. guns are placed in sponsons on the deck; four of 10-cm. are placed under and two upon the top-gallant forecastle; four are upon and under the poop. Some of the 47-mm. guns are in the lower tops, and the four 37-mm. guns in the upper tops. In order to secure independence of fire, all the guns will be mounted *en échelon*. The Catinat has six search-lights, two being in the tops. She is intended for service in distant seas and is sheathed with wood and coppered. Catinat

Three other cruisers of this type, E_4, E_5, E_6, are projected for 1894.

The cruisers Duchayla, Cassard and d'Assas are of the same type, and belong to the modified Chasseloup-Laubat class. Their principal dimensions are as follows:—Length between perpendiculars, 325 ft. 6 in.; beam, 44 ft. 11 in.; depth amidships, 29 ft. 9 in.; mean draught, 19 ft.; displacement, 3992 tons. They are protected by an armoured deck 1¼-in. thick amidships and 3¼-in. on the slopes. A Duchayla, Cassard, and d'Assas.

maximum power of 9600 horse-power and a normal power of 6000 horse-power will be developed in two vertical triple-expansion engines. There are twenty d'Allest boilers, which are arranged in three compartments, and they are tested to 15 kilos. The estimated speed is 19 knots. The armament will include six 16-cm., four 10-cm., and twelve 47-mm. quick-firing guns, sixteen 37-mm. revolver guns, and six torpedo-tubes.

Casa-bianca. The torpedo gun-boat Casabianca is a sister ship of the D'Iberville described above, but is of 20 tons greater displacement.

Surprise. The gun-boat Surprise has a length of 183 ft. 9 in.; beam, 24 ft. 7 in.; draught forward, 8 ft.; aft, 12 ft. 3 in.; displacement, 626 tons; horse-power, 650; speed, 13 knots. This vessel is of steel, sheathed with wood and coppered. She has a single screw, and is intended for service in distant waters; she has three masts, and is square-rigged on the foremast. Armament:—two 10-cm., four 65-mm., and four 47-mm. quick-firing guns.

Lavoisier. The third-class cruiser Lavoisier is of the Galilée type, of 2300 tons displacement, 6000 horse-power, and with a speed of 20 knots. She will be constructed at Rochefort. Her armament will comprise four 14-cm., two 10-cm., eight 47-mm., eight 37-mm. quick-firing guns, four 37-mm. revolver guns, and four torpedo-tubes.

Trials. Only a few ships of large size have been completed for sea during the year.

Magenta. On the trial trip of the Magenta a speed of 16¼ knots was attained. This ironclad is of comparatively old design (she was laid down ten years ago), and formed part of the programme of 1883. It is certain that sundry modifications will have to be introduced in her superstructure, the height of which is excessive, and burdens the hull unnecessarily. It was thought that the vessel would heel to a dangerous angle when the helm is put hard over at high speed. Under these circumstances, and with her big guns on the side to which she is turning, she does heel to 14 degrees, which is excessive, but not dangerous to the stability of the ship. The stability of the Magenta is rather less than that of the Neptune, and still less than that of the Hoche of the same class, owing to the fact that the superstructure has been considerably raised.*

Isly. The second-class cruiser Isly, of 4166 tons, attained a speed of 16·8 knots with natural and 18·1 knots with forced draught; the engines developing 8100 indicated horse-power. The trial was made in a heavy sea, which reduced the speed by nearly half a knot.

Dupuy de Lôme. The armoured cruiser, Dupuy de Lôme, has met with a serious

* *Cf.* Mr. Laird Clowes' remarks on these vessels, p. 127.

mishap, which will delay her completion for some months. After very satisfactory trials with natural draught (when a speed of 18·4 knots was attained with 9500 horse-power) a trial was made with forced draught in July, 1893. 13,000 horse-power was developed, and a speed attained of 19·7 knots, but the trial was interrupted by the heating of the eccentrics. In the following October, the trial was resumed, on which occasion the Fox furnaces amidships gave way completely, although, owing to the mildness of the steel, no fracture took place. The boilers were thereupon taken out for modification.

The third-class cruiser, Coetlogon, 1850 tons, the engines of which have been changed, has undergone the prescribed trials. Coetlogon.

The following ships have just been made ready for sea for the first time: namely, the ironclad Brennus, constructed at Lorient, of 11,002 tons and 14,000 horse-power; the armoured coast defence vessel Jemmapes, of 6590 tons and 8400 horse-power; the armoured cruiser Latouche-Tréville, of 4745 tons; and the torpedo cruiser d'Iberville, of 925 tons. These vessels have commenced their trials. Several ships have received their quick-firing armament. Brennus. Jemmapes. Latouche-Tréville. d'Iberville.

Several topedo-boats constructed by Normand, of Havre, have made very remarkable trials. Among these, numbers 154, 153, 146, and 145 attained speeds respectively of 23·15, 23·76, 24·26, and 24·16 knots. These boats are 118 ft. long, 13 ft. 1½ in. beam, 8 ft. 7 in. depth of hold, and have a displacement of nearly 46½ tons. All except No. 153 are fitted with Du Temple boilers, the exception being a Normand boiler. These small vessels can cover a distance of 1800 miles at 10-knot speed with a consumption of ten tons of coal. Torpedo-boat trials.

Still more remarkable results have been attained by the sea-going twin-screw Normand torpedo-boats. Three of them, the Dragon, Grenadier, and Lancier, are of the following dimensions: Length, 137 ft. 9 ins.; beam, 14 ft. 9 ins.; depth, 9 ft. 10 ins.; displacement, 118 tons. Their respective speeds were 25·03, 25·25, and 25·79 knots. Carrying 15 tons of coal, they can accomplish at 10 knots a distance of 2000 miles. All three are fitted with Du Temple boilers. Their equipment, including coal, weighs 32·37 tons, representing nearly double the weight carried in most of the foreign torpedo-boats. The corresponding weight carried by the Coureur, built by Thornycroft, on her trials was only 17·2 tons. Dragon. Grenadier. Lancier.

A fourth Normand torpedo-boat, the Chevalier, attained a still more remarkable speed. This boat is 144 ft. 5 ins. long, 14 ft. 9 ins. broad, with a depth of 9 ft. 10 ins. Displacement, 116 tons; speed, Chevalier.

27·22 knots. With about seven tons of coal a distance of 1000 knots at a speed of 10 knots can be covered.

Normand's boats.

It will be seen that three types of torpedo-boats have recently been turned out from the Normand yard, viz.: torpedo-boats of the first class (of which some sixty have been built during the last ten years for the French Navy); twin-screw torpedo-boats of the Dragon type, and similar boats of the Chevalier type; the difference consisting in an increase of the boiler pressure from 12 to 14 kilos., and of a corresponding increase in the dimensions of the various parts, including the grate surface.

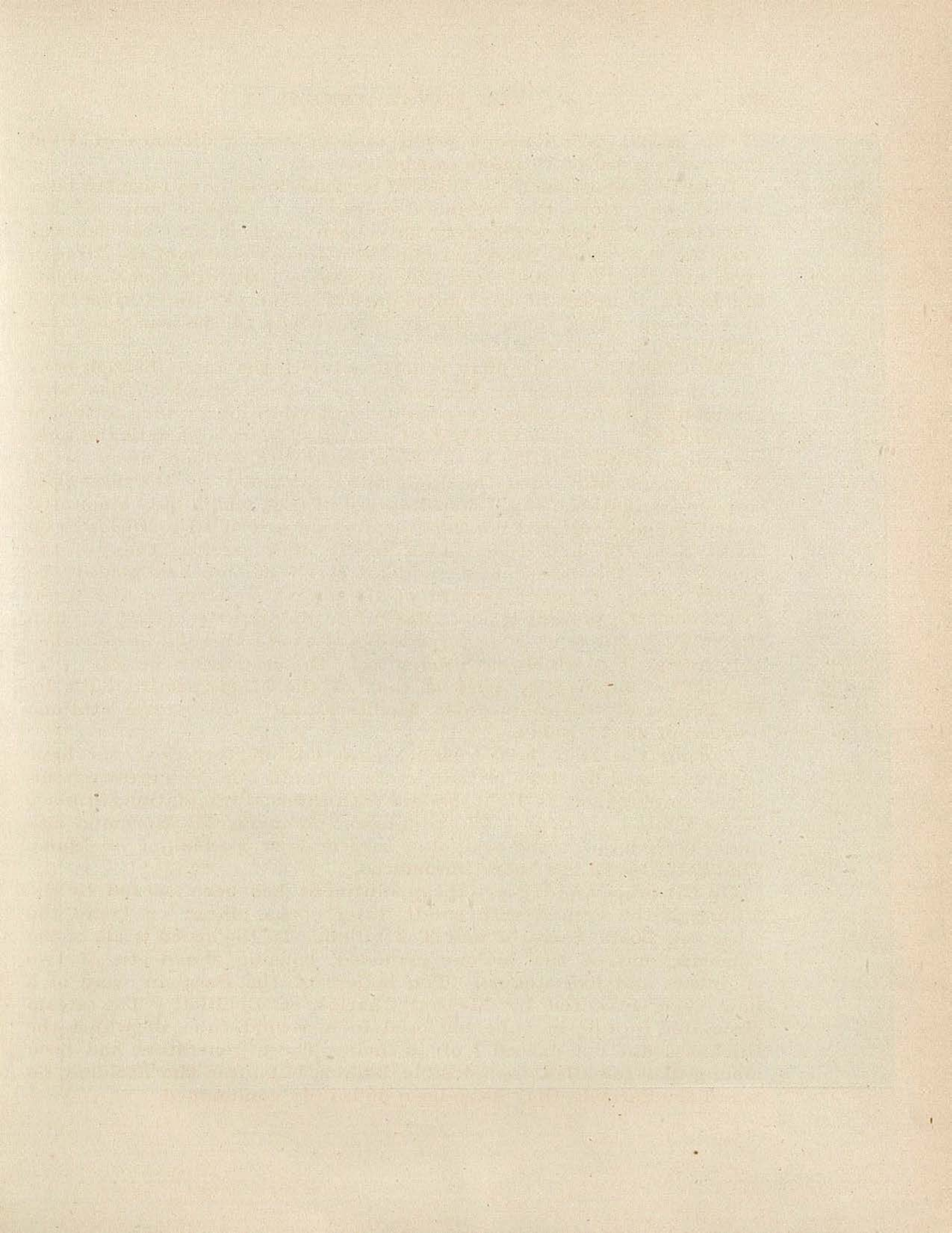
The Chevalier is the first boat fitted with the anti-vibration contrivances invented by M. Normand, the success of which has been complete. At high speed the unpleasant vibrations, which interfere so seriously with the working of the machinery and with the preservation of the hulls, have been completely done away with. M. Normand attributes the high speed attained by the first-class torpedo-boats to the small consumption of fuel, which only amounted to 1·1 lb. per indicated horse-power for a speed of 10 to 15 knots on boats Nos. 153 and 154. As a result of a careful study of the question of the position of rudders, M. Normand has placed the rudder of the Lancier forward of the screw, contrary to the usual practice at the present time. Statical considerations convinced him that the turning powers of torpedo-boats would thereby be considerably augmented, which has proved to be the case in his vessels.

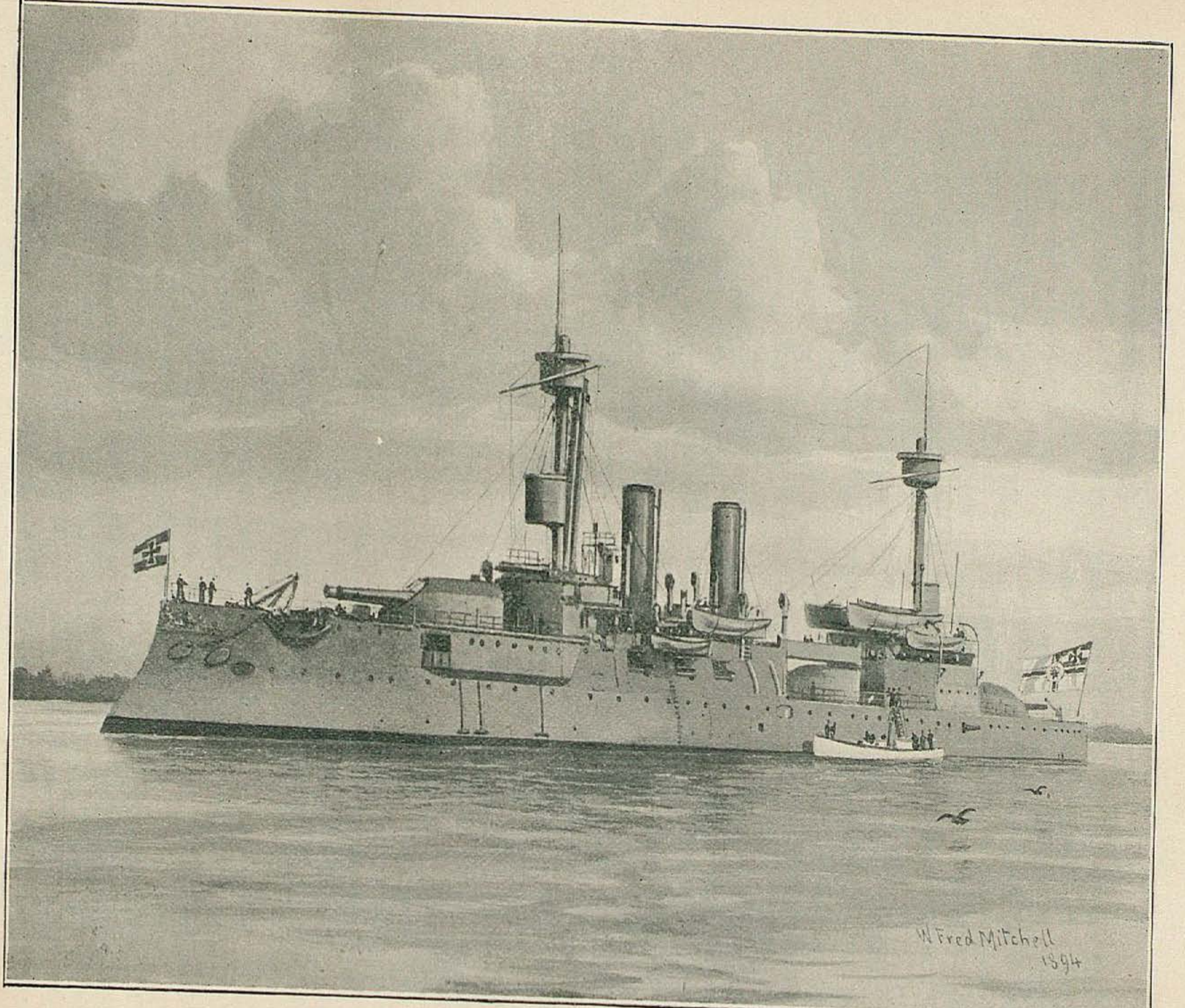
Mousquetaire.

Another noteworthy trial is that of the Mousquetaire, built by the Forges et Chantiers de la Mediterranée. This vessel attained a speed of 24·77 knots.

During the last three years, the speeds of torpedo-boats have been increased by three or four knots, a result due, to a great extent, to the employment of light boilers with internal circulation, in place of locomotive boilers. At the present moment, M. Normand has under consideration the sea-going torpedo-boat Forban, of 30 knots. This little vessel has been commenced.

On the other hand, grave disappointment has been caused by the failure of the boilers with small water space, placed on board the sea-going boats Sarrasin and Tourbillon. In the speed trials of the Sarrasin, one of the boilers exploded, causing the death of two engineers and five stokers. The boilers of the Sarrasin were of a new type, invented by Messrs. Charles et Bobillot. The steam circulated in a $6\frac{1}{4}$-in. tube, enclosed in a second tube, of which the thickness did not exceed $\frac{1}{8}$ of an inch. These generators had been among the so-called inexplosible boilers, but after the accident on board the Sarrasin they have been definitely condemned.





"BRANDENBURG."

GERMAN BATTLE-SHIP.

Germany.

The estimates for 1894–1895, which have not yet been considered by the Reichstag, provide for an increase of 1036 men in the *personnel* of the Imperial Navy. This figure includes 38 officers, 27 midshipmen or cadets, 5 engineer-officers, and 314 seamen, thus raising the number of officers to 643, of midshipmen to 247, and of engineer-officers to 80. The credits asked for fix the effective total at 20,948 officers and seamen. The aim of the German Admiralty, under the vigorous impulsion of the Emperor, is to possess a young, well-trained and energetic *personnel*. With this object in view, William II. did not hesitate, at the termination of the Naval Manœuvres of 1893, to place on the retired list a Vice-Admiral, a Rear-Admiral (only forty-nine years of age), a captain, and four lieutenant-commanders of torpedo-boats, these officers not appearing to possess the necessary qualities for service afloat. *Personnel.*

The work of coast defence has been placed entirely in the hands of the Navy.

The coast-defence armour-clad Hagen, of the modified Siegfried type, has been launched. She is sister-ship to the Beowulf, Heimdal, Hildebrand and Frithjof, of 3600 tons and 4800 horse-power. They are protected by a belt and an armoured deck. The armament consists of three 24-cm. (9·4-inch) guns, two of which are mounted in barbettes, one forward, the other aft. The Hagen is to form part of the Baltic Squadron. The sister-ship Frithjof attained the estimated speed of 16 knots. The Heimdal and the Hildebrand are now going through their trials. A vessel of the same type (the "T") will be fitted with Thornycroft boilers, and should be completed in 1896. **Hagen.**

The cruiser Gefion (formerly "J") has been launched from the Schichau yard at Elbing. Length, 344 ft. 6 in.; beam, 48 ft. 8 in.; displacement, 5000 tons; horse-power, 9800; speed, 20 knots. This ship is protected by a 3-in. armoured deck and by a cellulose belt at the water-line. Her principal armament consists of six 15-cm. quick-firing Krupp guns and six torpedo-tubes. She will have twin-screws and two military masts. **Gefion.**

The ironclad Brandenburg, of 10,300 tons displacement and 9500 indicated horse-power, built by the Vulcan Company, has been delivered at Kiel. At her trials, a speed of 16½ knots with 9640 horse-power was attained. The sister ship, the Wörth, attained 17 knots with forced draught. The two other ironclads of the same type provided for in the programme of 1889, the Kurfürst Friedrich Wilhelm, and the Weissemburg, will commence their trials in the course of the present year. **Brandenburg.**

Of the ships under construction, the coast-defence vessels of the Siegfried type (3600 tons), "T" and "V," will be delivered in 1896. The cruiser "F," the sloop "H," and one divisional torpedo-boat will be completed in 1895.

The German Admiralty asks for credits to replace the ironclad Preussen, launched in 1873, and the cruiser Leipzig, launched in 1875, and for the construction of a sloop of the Falke type. It is proposed to expend, during 1894–5, £50,000 on the two vessels above-mentioned, and £60,000 on the sloop. The cruisers Leipzig and Charlotte have been placed in the reserve, and will be used for harbour service.

ITALY.

Notwithstanding the financial situation Italy seems indisposed to reduce her naval expenditure. The estimates for 1894 amount to £3,995,115. It is true that this figure was fixed previous to the Ministerial crisis which brought M. Crispi into power, but there is reason to suppose that the economies with regard to the Navy to be effected by the Crispi Cabinet will be unimportant. These economies have been stated to amount to £200,000, the Government promising at the same time that the reduction will not compromise in any way the national defence. This promise is a hollow one, because so large a reduction cannot be effected on the ordinary votes. However this may be, Italy has abandoned the extensive programme attributed to Admiral Saint-Bon. After much hesitation the largest types of ironclad have been definitively given up, and a type not exceeding 10,000 tons has been adopted in their place.

Construction in 1893.

In 1893 the sum of £1,080,000 voted by Parliament for new construction was to have been divided between the following vessels: the ironclads Re Umberto, Sicilia, and Sardegna, of 13,250 tons; the cruiser Marco-Polo, 4390 tons; two new first-class ironclads; the four armoured cruisers of 6500 tons; one second-class cruiser; eight torpedo cruisers; eight torpedo-boats, and several special service vessels. It will be remarked that the number of ships completing afloat and to be laid down has little relation to the ship-building votes.

Admiral Saint-Bon, Emanuele Filiberto.

The ironclads Admiral Saint-Bon and Emanuele Filiberto have been laid down; the former at Venice, the latter at Castellamare. Length, 344 ft. 6 in.; beam, 68 ft. 10 in.; mean draught, 24 ft. 9 in.: displacement, 9800 tons; 13,500 horse-power; speed, with natural draught, 16 knots, with forced draught, 18 knots. Protection is given by a 9¾-in. belt at the water-line, and by an armoured deck 1½ in. to

3-in. in thickness. The armament comprises four 25-cm. (9·8-in.) guns mounted in pairs in two turrets, one forward and one aft; eight 15-cm. and eight 12-cm. quick-firing guns, and several 57-mm. guns on the turrets and tops. The principal turrets are at either extremity of the armoured redoubt, which contains the 15-cm. guns. It will be seen from this short description that these two ships, owing to the thickness of their armour and to their armament, should be classed as armoured cruisers rather than as battleships.

Armoured cruisers. The first-class armoured cruisers (some of which are being built in the dockyards and others by contract) are to be named the Nino Bixio, Garibaldi, Varese, Carlo Alberto, and Vettor Pisani. They have a displacement of 6500 tons, 13,000 horse-power, and will be protected by 6-in. armour at the water-line and on the redoubt. The Vettor Pisani, now building at Castellamare, will probably be launched during the current year. Her armament, as well as that of the Carlo Alberto, comprises twelve 15-cm., six 12-cm., ten 57-mm., and ten 37-mm. quick-firing guns.

Torpedo cruiser. The torpedo cruiser of the Partenope type (displacement 846 tons) will be undertaken by the Cravero Company, and a cruiser of the Lombardia type, 2500 tons, by Messrs. Ansaldo. of Leghorn.

Programme of 1894. The programme of new construction for 1894 has not yet been officially announced. According to the Italian naval journals three ironclads of from 11,000 to 12,000 tons, and 18 to 19 knots; three swift cruisers of 3000 to 4000 tons; twelve torpedo-boats and four transports (*transports dits d'escadre*) will be laid down. At the same time, it must be added that such a programme does not agree with the probable figure of the Italian Navy estimates.

Ships launched. Liguria. The vessels launched in 1893 include the torpedo-ram Liguria, which may be classed as a cruiser. Length, 262 ft. 6 in.; beam, 39 ft. 4 in.; draught, 16 ft. 9 in.; displacement, 2280 tons. The engines are to develop 4000 horse-power with natural, and 6800 horse-power with forced draught. The estimated speed is 18 knots. Protection, an armoured deck 1 in. to 2 in. thick. Armament, four 15-cm., six 12-cm., eight 57-mm. guns, two 37-mm. Maxim guns, and six other smaller pieces. The ship's complement will be 300 men. It will be remarked that the dimensions of this ship, as stated above from the particulars given in the Italian newspapers at the time of her launch, differ from those to be found in most of the published lists.

Elba. The particulars of the cruiser Elba are as follows: Length, 272 ft. 6 in.; beam, 40 ft. 8 in.; draught, 17 ft. 6 in.; displacement, 2730 tons; speed, 19 knots. Protection, a 1-in. armoured deck covering the engines and boilers. Armament, four 15-cm. guns, two forward and two aft; six 12-cm. guns on the broadside, six 57-mm.

guns, and four torpedo-boats. All the guns are quick-firing. Two horizontal triple-expansion engines are to develop 6500 horse-power with forced, and 4000 horse-power with natural draught. There will be four cylindrical boilers with six furnaces placed in pairs in two separate compartments, and working up to a pressure of 155 lbs. The Elba will carry a complement of 12 officers and 235 men.

Calatafimi. The torpedo-cruiser Calatafimi, of 846 tons and 20 knots speed, is of a type already described.

Steam Trials. Several ships have completed their trials, including the first-class ironclad Re Umberto, 13,251 tons. With forced draught this ship developed 17,000 horse-power and a speed of 18·2 knots, the estimated horse-power being 19,500. The engines were not, however, worked to their fullest power, probably out of consideration for the boilers. In the turning trial, at full speed, the Re Umberto made a half-circle in 3 minutes 38 seconds. This vessel has been commissioned, and forms part of the active squadron.

Sardegna. The Sardegna, of the same type as the Re Umberto, has made her preliminary trials, which have been satisfactory. This vessel will be available in the course of the current year. Of the group of large ironclads undertaken within the last few years, there only remains the Sicilia, now in construction at Venice, to be completed.

Etruria. The cruiser, Etruria, of 2280 tons and 6500 horse-power, attained a speed of 18 knots with natural and 20 knots with forced draught.

Mention must also be made of the experiments made with submarine boats of original shape; the use of petroleum as fuel in several vessels of the fleet; and the manœuvres, in which every available vessel took part. The latter have shown that the Italian Navy suffers as much as, if not more than, other Navies from the difficulty of procuring good stokers.

Russia.

Estimates. The Russian Mediterranean Fleet has been reconstituted; but, of the five ships which passed through the Straits of Gibraltar, two have proceeded to the Pacific Station by way of the Suez Canal. The estimates for 1893 amounted to £5,543,644; the corresponding sum for 1894 will be £5,692,377, of which amount £2,255,627 will be allotted to new construction, to the completion of vessels afloat, and to fitting them for sea.

Programme for 1894. This expenditure will be divided between the following vessels of the Baltic Fleet: the ironclad Cizoi Veliky, 8880 tons, 8500 horse-power; the three armourclads of 10,960 tons, the Sevastopol,

Poltava, and Petropavlosk; the armoured coast-defence vessel Amiral Senjavin, 4126 tons, 4250 horse-power. These ships will be launched this year. The coast-defence vessel Outshakoff, sister-ship to the Senjavin, was launched last autumn, and is being completed afloat. In the dockyards on the Neva a new Cizoi, a third Rurik (the second is called the Rossia), and two torpedo-gunboats, of the Pocadnik type, 400 tons, 3000 horse-power, and 22 knots, are to be laid down. In the Black Sea two ironclads will be built, one of the Cizoi type, the other of the Three Saints class, to be called the Paris, in remembrance of the reception given in France to the Russian Squadron, which will be described later.

The following particulars of the battleship laid down at Nicolaieff are quoted from the *Times*. It is reported that she is to be named the Three Hierarchs, and not the Paris, as was originally stated. "Length, 344 ft. 6 in.; beam, 68 ft. 10 in.; displacement, 8880 tons; twin screws, driven by vertical triple-expansion engines of 8500 horse-power in the aggregate, fed by 16 cylindrical boilers, placed in groups of four in as many separate compartments; two funnels; one military mast with two armoured tops; one signal mast; bunker capacity for 800 tons of coal, or sufficient for 2000 miles at 10 knots; extreme speed, 16·5 knots; an armoured belt 15·7 in. thick four-fifths of the ship's length, and of 11·8 in. thick along the rest of the water-line, surmounted by a broad continuous belt of 5-in. armour for the protection of the secondary armament; a 3-in. end-to-end protective deck of steel; two turrets, the forward one of 11·8-in. armour, containing a pair of 11·8-in. guns, and the after one of 10·2-in. armour containing a couple of similar weapons; transverse bulkheads of 11·8-in. armour; and, as secondary armament, six 5·9-in. quick-firers, and twenty 1·8-in. and 1·4-in. quick-firing guns. There will be two torpedo-tubes on each broadside, one in the bow, and a sixth aft." Cizoi Veliky (2).

At Copenhagen a cruiser yacht of 5557 tons, and 23 knots speed, is under construction for the Emperor. This ship can be armed in case of war, and will be manned by picked men of the Imperial Navy.

The programme for 1894 includes the construction of eight sea-going torpedo-boats of 150 tons and 26 knots speed. A certain number of vessels of this class are already in hand. Torpedo-boats.

The Russian Navy has lost two ships, the cruiser Vitiaz, sister ship to the Rynda, which was wrecked off the entrance to Port Lazareff, and the double-turreted monitor Rusalka, 2026 tons, lost with all hands, in September last, on the voyage from Revel to Helsingfors.

Three Saints.

The ironclad Three Saints (Tria Sviatitelia) was launched on the 12th November at Nicolaieff. Length, 357 ft. 6 in.; beam, 72 ft. 2 in.; mean draught, 27 ft.; displacement, 12,480 tons; 10,600 horse-power; speed, 16 knots; coal capacity, 1000 tons; endurance at 10 knots, about 4000 miles. The design of this vessel was suggested by that of the Nile and the Trafalgar. She is partially protected by a 16-in. to 18-in. belt at the water-line, ending forward with a 16-in. armoured bulkhead, and aft with a 14-in. armoured bulkhead. The 3-in. armoured deck extends from each bulkhead to the ends of the ship. An armoured octagonal casemate, rounded at the ends, protects the base of the turrets. This casemate is 217 ft. long on the centre line, and 172 ft. on the sides. Covered with 16 in. armour, it protects not only the base of the turrets, but also the engine hatches.

The upper casemate, also of octagonal form, constructed above that just described, 140 ft. long in the centre line, and 93 ft. at the sides. It occupies the space between the turrets, and will contain the minor armament. It is protected by 5-in. of hardened steel. The principal turrets are situated one forward and one aft of the upper casemate. Each will be armed with two 12-in. guns of 40 calibres. The upper casemate will be armed with twelve 6-in. and four 4·7-in. Canet quick-firing guns. The armament will also include forty-six guns of small calibre or revolver guns, making sixty-six in all.

The Three Saints will carry six torpedo-launching tubes, of which two will be submerged. The vessel was commenced on the 14th August, 1891, and has, therefore, been more than twenty-seven months on the stocks. At the time of launching fifty-five-hundredths had been completed.

Senjavin.

The coast-defence vessel Senjavin has been launched from the Neva dockyards; length, 278 ft. 9 in.; beam, 52 ft. 6 in.; draught, 17 ft.; displacement, 4126 tons. Protection: a 10-in. armoured belt and a 3-in. armoured deck. Armament: four 9-in. guns, mounted in pairs, in two closed turrets, forward and aft; four 6-in. quick-firing guns, in sponsons; six 47-mm. Hotchkiss, eight 37-mm. guns, and four torpedo-launching tubes.

Outshakoff

A *Times* telegram of the 8th November says of the Admiral Outshakoff, sister-ship to the above: "Her two engines and four boilers have been made by Messrs. Maudslay and Field, in England; the former are triple expansion, representing together 5000 indicated horse-power, and capable of making 16 knots. Her normal supply of coal is calculated at 200 tons, although she is considered capable of carrying double that quantity."

Torpedo gunboats.

The torpedo gunboats, Gaidamak, Griden and Vsadnik, are com-

pleted. They are 192 ft. 6 in. long, 24 ft. 2 in. broad, draw 7 ft. 6 in. of water, and are of 400 tons displacement. The armament is composed of two 47-mm. and seven 37-mm. quick-firers, and three torpedo-launching tubes. Their machinery develops 3000 horse-power. They have steamed 21 knots.

The armoured gunboat Otvazny, 1500 tons, 2000 horse-power, has a speed of 13 knots. At Malmo, a school-ship, Voin, has been built. Several torpedo-boats have made their trials, realising a speed of 21 knots. **Otvazny.**

Austria.

The Austro-Hungarian naval estimates for 1894 amount to £1,247,768, of which £506,520 will be devoted to the repair of existing ships and to new construction.

New coast-defence vessels. Three armoured coast-defence vessels to replace the Kaiser-Max, the Don Juan (of Austria), and the Prince Eugen, have been commenced. The *Times* says: "They are of 5500 tons displacement, 9800 horse-power, and 17·5 knots speed. One is being built at Pola, and two are on the stocks at San Rocco, Trieste. The vessels are double-bottomed, and will carry 10·6-in. Harveyised steel armour."

Tegetthoff In the meantime the old battleship Tegetthoff has been radically reconstructed. Triple-expansion engines, built by Herr Schichau, of Elbing, have been put into her, together with a modern armament, which includes a considerable number of quick-firing guns. The present armament consists of six 24-cm. (9·5-in.) guns, five 15-cm. (6-in.) quick-firers, two 7-cm. steel bronze guns, fifteen 47-mm. quick-firers, and two 8-mm. mitrailleuses. The larger weapons will be worked by electricity, but are also capable of being worked by hand, as in all Austrian men-of-war.

The new engines have given a considerable increase of speed, as the following particulars of the trials will show. She has attained on her six hours' run a mean speed of 15·3 knots with 7340 indicated horse-power. On her forced draught trial she made 16·3 knots with 8400 horse-power. Before her reconstruction the mean speed was 14·37 knots. She is now fitted with two military masts.

Maria Teresa. The 1st class cruiser, Kaiserin und Königin-Maria Teresa has been launched; length, 351 ft.; beam, 52 ft. 6 in.; draught, 20 ft.; displacement, 5270 tons; 10,000 horse-power; speed, 19 knots. Protection: an armoured deck and a cofferdam filled with cellulose. Armament: two 24-cm. 9·4-in. guns in barbette turrets, forward and aft; ten 15-cm. quick-firing guns, mounted on sponsons, in two tiers; thirteen guns of small calibre, and four torpedo-launching tubes.

Szamos.

The monitor Szamos, built at Buda Pest for the defence of the Danube, has been commissioned. A smaller vessel of the same type is building.

Denmark.

The estimates for 1893–1894 amount to £335,115 for the ordinary, and £35,350 for the extraordinary expenditure. The armourclad Skjold, of 2150 tons displacement and 13 knots speed, is to be laid down at Copenhagen. The Heimdal, a 3rd class cruiser of the Geiser type, is also building at Copenhagen. The construction of the torpedo-catchers Nordkaperen and Makrelen, of 120 tons and 20 knots speed, may be mentioned.

Holland.

We gave, last year, the new programme of construction authorised by the Dutch Parliament. In conformity with the proposals of the Minister of Marine, three armoured coast-defence vessels have been laid down, one at Amsterdam, one at Flushing, and the third at Rotterdam. They will be named the Evertsen, Piet Hein and Kortenaer; and will be of 3400 tons displacement and 20 knots speed.

The Navy estimates for 1894 amount to £1,301,612.

Norway.

The Ladies' Club at Christiania organised a subscription to present to the Norwegian Navy a ship of war. With the amount subscribed —£30,000—it is proposed to build at the Schichau yard, at Elbing, a torpedo-gunboat of 380 tons, of the type of the German divisional torpedo-boats.

Spain.

Infanta Maria Teresa.

The armoured cruiser, Infanta Maria Teresa, of 7000 tons, has undergone her trials at Ferrol. With natural draught, 9558 horse-power was developed, the pressure being 145 lbs., and the corresponding speed 18·5 instead of 18 knots as estimated. With forced draught, during 4½ hours, the mean horse-power developed was 13,758, with a pressure of 145 lbs. per square inch; and the speed was 20·25 knots. The weather was very fine, with a heavy swell

from the Atlantic. The triple-expansion engines were designed by Mr. James McKechnie, engineering manager of the Nervion Dockyard. The vessel is fitted with four double-ended and two single-ended boilers and 40 furnaces. The Infanta Maria Teresa, the principal characteristics of which are already known, possesses, however, certain features which may be restated. The armoured deck, placed at a certain height above the water-line throughout the greater part of the vessel, curves down below the water-line at the ends, the thickness being 3 inches amidships and two inches at the extremities. The 12-in. armoured belt, which has a thick backing of teak, extends four-fifths of the length of the vessel, and covers the space from the armoured deck to below the water-line. The Infanta Maria Teresa was built at Bilbao.

At the same place, her sister ships, the Almirante Oquendo and the Vizcaya are completing afloat. Three torpedo-gunboats of 850 tons and 20 knots of the modified Filipinas type, have been ordered from private yards. Each of these ships will cost £171,425. Almirante Oquendo. Vizcaya.

Sweden.

The Thule, a small ironclad of 3135 tons, and 3150 horse-power, has been completed. A ship of the same type, with an estimated displacement of 3400 tons, is to be undertaken. Her armament will consist of two 10-in. guns, placed in two turrets; four 4·7 quick-firing guns; several smaller guns, and three torpedo-tubes. The Minister of Marine has proposed a programme to be completed in five years, involving an expenditure of £580,000. In 1895, an ironclad and a look-out ship will be commenced, and will be completed the following year, when a new ironclad will be undertaken.

The programme includes the construction of three small ironclads, one look-out ship, one transport, and several boats for submarine mining work.

United States.

The most important naval event of the past year was the great Naval Review, at New York, when the leading naval powers were represented by vessels of the newest types.

The change of administration which took place last year does not appear to have materially modified the naval policy of the great American Republic. It is announced that the Secretary of the Navy, Mr. Herbert, will ask authority from Congress for taking in hand

new construction. Mr. Herbert comes well equipped to the office, having been for several years one of the representatives from Alabama in Congress, and as such was the chairman of the Naval Committee of the House for two years before entering President Cleveland's Cabinet. He is giving a much-needed attention to the wants of the *personnel*.

American inventions.

In America, all that contributes to the offensive and defensive power of ships of war is studied with a deep interest. Experiments are made daily with new contrivances, proceeding from the fertile brains of American inventors ; though, thus far, few ideas which have not been introduced in Europe have been adopted. It is true that the value of the pneumatic and dynamite gun has been established, but the idea of employing this weapon afloat has been abandoned. The Howell torpedo has been more successful, and has recently given very satisfactory results. At the present moment, the authorities have under consideration a submarine gun, firing a torpedo-shell, which is a more simple contrivance than the self-acting torpedo. In the matter of ordnance, and in the manufacture of smokeless powder, enormous progress has been made, while, by means of the Harvey process, armour plates have been manufactured of nickel steel. On the other hand, several failures have to be noted in connection with the trials of new vessels.

Massachusetts and Oregon.

The ships launched include the ironclads Massachusetts and Oregon. The former and the third ship of this class, the Indiana, which was launched in February, 1893, are being built at Messrs. Cramp's ; the Oregon is building at the Union Iron Works, San Francisco. Length, 348 ft. ; beam, 69 ft. 3 in. ; mean draught, 24 ft. ; displacement, 10,231 tons ; horse-power, 7000 with natural, 9000 with forced draught ; estimated speed, 15 knots. Protection is afforded : (1) by a partial belt of 18 in., covering 56 per cent. of the length, and enclosing a space subdivided into numerous water-tight compartments ; (2) by 4½-in. armour between the lower parts of the turrets ; (3) by a 3-in. armoured deck. The turrets will be fitted with 7-in. shields for the 13-in. guns, and with 6-in. shields for the 8-in. guns. Armament : four 13-in. guns mounted in pairs in two barbette turrets, forward and aft ; eight 8-in. guns in four turrets, placed at the salient angles of a superstructure which rises between the upper turrets ; four 6-in. guns in sponsons on the same deck as the 8-in. guns ; twenty 6-pounders, four 1-pounders, four Gatlings, and six torpedo-tubes. These three ironclads were commenced in 1891. The cost of the hulls and engines of the two former was estimated at £604,000, that of the Indiana at £636,000. The Indiana has been through her contractor's trials.

The cruiser Minneapolis (formerly No. 13) has been built by Cramp, of Philadelphia. Length, 412 ft.; beam, 58 ft. 2 in.; mean draught, 24 ft.; displacement, 7475 tons; estimated speed, 21 knots. She is sister ship to the Columbia, whose trials will be described later. Armament: one 8-in. gun; two 6-in., eight 4-in., ten (?) 6-pr., four (?) 1-pr. quick-firing guns; four Gatlings, and five torpedo-tubes. The Minneapolis has triple screws. Minneapolis.

The Ram Katahdin, designed by Admiral Ammen, has a length of 243 ft.; beam, 43 ft. 6 in.; mean draught, 15 ft.; displacement, 2050 tons; horse-power, 4800; estimated speed, 17 knots. Armament: four 6-pounder quick-firing guns. This vessel is only intended to act as a ram. She will be partially submerged at the moment of entering into action, her armoured deck, protected with 6-in. armour at the sides and 2-in. on the horizontal portion, remaining alone visible. She will carry 7 officers and 91 men, of whom 71 will be engineers or stokers. Ram Katahdin.

The reconstruction of the double-turreted monitors, the Terror, Amphitrite, and Monadnock, of 3990 tons, will shortly be completed. Two large vessels have been commenced. The Puritan, of 6060 tons, also a double-turreted monitor, is nearly completed. Terror, Amphitrite and Monadnock.

The armament and protection of the Iowa were fully described on pp. 43–45 of the *Naval Annual* for 1893. The Iowa is being built by Cramp, of Philadelphia. Her principal features are: length at the water-line, 360 ft.; beam, 72 ft.; mean draught, 24 ft.; displacement, 11,286 tons; horse-power, 11,000; speed, 16½ knots. The Iowa will be provided with two triple-expansion vertical engines, with double-ended boilers, and with tubular boilers with triple furnaces. The engines will work up to 112½ revolutions per minute, the pressure on the boilers being 160 lbs. The estimated cost of the ship, without armament, is £602,000. It is expected that she will be completed by October 1st, 1896. Iowa.

The Brooklyn, also described in the *Naval Annual* of 1893 (pp. 45 and 47), will be the largest cruiser of the American Navy. Length, 400 ft. 6 in.; beam, 64 ft.; mean draught, 24 ft.; displacement, 9250 tons; 16,900 horse-power; speed, 20 knots; coal supply, 900 tons, which may be increased to 1650 tons. Brooklyn.

Two cruisers of 1600 tons and one of 1750 tons are to be laid down. The construction of a torpedo-cruiser, 250 ft. long, 27 ft. 6 in. beam, 800 tons, and 600 horse-power, with a speed of 23 knots, has been decided upon.

The ships which have completed their trials generally attained results exceeding expectation. The speeds realised were as follows: Armoured coast defence vessel Monterey, 4048 tons and 5500 horse- Trials.

power, 13·6 knots; armoured cruiser New York, 8150 tons and 16,500 horse-power, 21 knots, the contract speed being 20 knots; protected cruisers, Detroit, Marblehead, Montgomery, 2000 tons, 5400 horse-power, 18·71 knots, 18·94 knots, 18·87 knots respectively, instead of 17 knots estimated; the cruisers Machias and Custine, 1050 tons, 1600 horse-power, 15·46 knots and 15·61 knots instead of 13 knots; the Bancroft, cadet training-ship, 838 tons, 1300 horse-power, 14·37 knots instead of 12 knots.

Monterey. Of these vessels, the Monterey alone failed to attain the estimated speed, steaming 13·6 knots only, instead of 16 knots. She was to some extent an experimental vessel, having ¼ Scotch boilers and ¾ tubulous Ward boilers.

The following extract from the *Army and Navy Gazette* probably accounts for the failure:—

"The sea was smooth, and the ship did not show any tendency to pitch, but when steaming at a speed of from 11 to 13 knots the water ran over her bow and grew in volume as the speed increased until right at the point of her bow there was a steady torrent pouring on her from four to five feet above the deck. It rushed over the forward part of the deck for a distance of 30 or 40 ft. back of the hawse pipes. The main volume of water was just at a point of the bow where the hawse pipes, covered by immense iron hoods, are placed, and these, with the anchors which are secured on both sides of the hawse pipes, formed a breastwork, which caused the water to bank at that point. The wave was broken before it reached within 10 ft. of the forward turret, and ran off the deck or along the sides for a considerable distance. If this occurs in smooth water it is safe to predict that matters will be a good deal worse in a seaway."

Columbia. The remarkable results obtained from the protected cruiser Columbia, 7475 tons and 21,000 horse-power, remain to be noted. This ship is propelled by three screws; the port and starboard engines are side by side; the centre engine aft of these, in a separate compartment, between the screw shafts of the two other engines. The three engines are precisely similar, the diameters of the cylinders being respectively 42, 59, and 92 inches, the stroke of the pistons 42 inches. The centre screw has a diameter of 14 ft., those on either side of 16 ft. There are eight double-ended boilers, each connected with eight furnaces, and working up to a pressure of 24¼ lbs. The Columbia steamed 22·80 knots, instead of the estimated 21 knots. Great pride is naturally felt in this brilliant result, which exceeds the records of other large ships of war.

The chief feature of the trial is the great speed obtained with the triple screws. If twin screws were used, 11,000 indicated horse-power

would pass through one shaft; now each shaft transmits only 7300 indicated horse-power. and the vessel has one more chance in case of breakdown. Referring to the triple screws fitted on the Columbia, Mr. George W. Melville, the chief of the United States Bureau of Steam Engineering of the Navy Department, says: "Knowing that it was extremely improbable that shafts of the great size necessary to transmit this enormous power to twin screws could be obtained in this country, either in reasonable time or with any guarantee as to strength, the Bureau decided to depart from the usual practice, and to divide the power into three parts instead of two, each being developed by a separate engine driving its own screw. It was still further influenced to do this by the knowledge that even in the case of the recurrence of so remarkable an accident as that which lately happened to the City of Paris, this cruiser would still have a reserve of power sufficient to drive her at a good rate of speed. Indeed, it is almost impossible to conceive a combination of circumstances or accidents that would render her entirely helpless." It was estimated that with one-third power and one screw, the ship could be driven about 15 knots; with two screws and two-thirds power, from 18 to 19 knots, the screw or screws not in use being allowed to revolve freely. This latter anticipation was realised. With natural draught (viz., an air pressure of ·73 inches) and a steam pressure in the boilers of 131·9 lbs., the Columbia steamed 18·87 knots. The port engine made 116 and the starboard engine 113 revolutions. Secretary Tracy, of the United States Navy Department, says: "A dozen such vessels would, in my opinion, exterminate the commerce of any country under the present conditions of commerce protection, and would thus, under these conditions, absolutely preclude an attack from a commercial state, however threatening in its demands, powerful in its armoured fleets, or aggressive in its foreign policy."

As a set off, serious troubles have been experienced with sundry other of the new ships, it having been ascertained that the Detroit and the sister-ships Montgomery and Marblehead have an insufficient initial stability, and that it will be necessary to effect some alteration in these cruisers. Want of stability.

The gunboats Machias and Castine are still less satisfactory in point of stability. The faults in construction of these vessels are to be corrected. They are to be lengthened, and the work has already been taken in hand.

The cruiser Kearsage, well known for her fight with the famous confederate ship Alabama in 1864 off Cherbourg, was wrecked on the 2nd October last on a reef of the Antilles; the whole of the crew Kearsage.

were saved. The Kearsage was launched in 1861. £6000 has been appropriated by Congress to the salvage of the Kearsage.*

ARGENTINE REPUBLIC.

Patria.

On the 25th December the torpedo-cruiser Patria was launched by Messrs. Laird, of Birkenhead. Length, 250 ft.; beam, 30 ft.; draught, 16 ft.; displacement, 1183 tons. Two vertical triple-expansion engines are to develop 2500 horse-power. The boilers, four in number, of the locomotive type, will work to a pressure of 155 lbs. per square inch. The armament will include quick-firing guns, machine-guns, and five torpedo-launching tubes.

Engagement off Rosario.

An engagement of some interest took place off Rosario on the 29th September last. In the course of one of the outbreaks so frequent in the Argentine Republic, the monitor Andes sided with the rebels. Orders were given for the small ironclad Independencia, recently constructed by Messrs. Laird, to attack the Andes. The Independencia, 2300 tons and 3000 horse-power, is protected by an 8-in. belt at the water-line, and by a 2-in. armoured deck. She carries forward and aft two 24-cm. Krupp guns in barbette turrets; four 12-cm. and four 47-mm. quick-firing guns, and two torpedo-tubes.

Preceded by the torpedo-sloop Espora, 520 tons, the Independencia proceeded to Rosario, where the Andes was lying. This monitor was very inferior in strength to her adversary, being of 1535 tons, with a speed of nine knots, and an armament of two 20-cm. Armstrong guns in a revolving turret, and two 8-cm. guns.

The engagement was not of an interesting character. The Espora having signalled the discovery of the Andes to the Independencia, the two vessels opened fire at 4375 yards. The Independencia continued to advance until the distance was reduced to about 1000 yards, when she ceased firing. The Andes, having had the worst of the fight, sought refuge among the foreign vessels anchored off the port of Rosario. The engagement, therefore, took the form of a simple cannonade; the retreat of the Andes being finally caused by a curiously effective shot. The Independencia attacking with her 24-cm. forward gun and two of the 12-cm. guns, one of the projectiles from the former penetrated the starboard quarter, the 6-in. armoured belt, two armoured bulkheads (four inches and six inches thick respectively), entered the opposite side of the ship and caused a leak in the sheathing. The crew having deserted the Andes, she was run ashore by her adversary to prevent her sinking.

According to the tables of gunnery, a 24-cm. Krupp gun of similar

* She has been burnt by Caribbean wreckers.—ED.

weight and 35 calibre should have a velocity of 2100 feet, and a penetrating power at 100 metres of 19 inches of iron.

The Independencia fired six rounds from her 24-cm. gun, fifty from that of 12-cm., and a few shots from the 47-mm. gun. The Andes fired nine rounds. The first shot fell several yards behind the Espora, the rest being wide of the mark. On the other hand, according to the reports, the Andes was hit several times; one of her engineers being wounded by the explosion of a shell.

If the feat of the Independencia is noteworthy, it is on account of the course taken by the shot rather than as a question of penetration. It is true that 15¾ inches of plate were penetrated, but these were separate, and therefore afforded less resistance than a single plate of the same thickness. At the same time, the accident gives an idea of the damage which would be caused to the older vessels by modern guns. It must also be remembered that the 24-cm. gun, with 2132 feet velocity, is not to be compared with the more recent weapons of 2624 feet velocity. The engagement thus briefly described only occupied 25 minutes.

BRAZIL.

A revolt of nearly the whole of the Brazilian Navy against the Government of President Peixoto took place in the month of September, 1893, since which time a continuous cannonade has been exchanged between the insurgent ships and the land forts in the harbour of Rio de Janeiro. The naval incidents of the revolt are dealt with by Mr. Clowes in Chapter IX. At the commencement of hostilities most of the ships were in a more or less defective state. The coast-defence vessel Javary sank in the Bay of Rio owing to a leakage caused by the discharge of her own guns. The President, not without cause, distrusted the officers of the Navy, and had accordingly given orders which rendered it impossible to fit out quickly those vessels which happened to be in Rio de Janeiro Dockyard. Thus, the new cruiser Almirante Tamandare could not be got ready till November.

A torpedo-gunboat constructed by Messrs. Armstrong left Elswick Shipyard for Brazil in October, 1893. She is built of steel, and her dimensions are: length, 196 ft.; beam, 21 ft.; mean draught, 7 ft. 9 in.; displacement, 480 tons. She is armed with two 20-pounders, four 3-pounders, and three torpedo-tubes, one of the latter being fixed in the stem, and two training on the deck amidship. Her engines Aurora.

develop 2300 horse-power, with which she attains a speed of over 18 knots during a three hours' trial. Her bunkers have capacity for 150 tons of coal.

The Destroyer.

With the view of subduing the insurgent ships, President Peixoto purchased and armed in the United States three merchant steamers, together with the Destroyer, built ten years ago, after the plans of Ericsson, but never acquired by the American Government. The following description of the Destroyer is by Lieutenant Jaques, United States Navy:—

"The vessel, or floating gun-carriage, is constructed with two decks separated by about three feet, the space to be filled with floats composed of corks or bags of india-rubber or other material inflated with air. The vessel is intended to be immersed to such depth that the lower deck will be below the water-line, and the portion of the vessel below it will be protected in a great degree from the enemy's shot by the surrounding water. In case the upper deck, or any part of the vessel above it, is penetrated by shot, such of the floats between the two decks as are not destroyed will continue to give buoyancy to the vessel.

"Across the vessel above the deck, in front of the pilot house, and in front of the base of the smoke-stack, is a shield composed of very heavy armour plates, inclined upward and backward in such manner as to deflect any shot or other projectile that may strike it. This shield has a backing of solid timber that would enable it to resist shot which might strike it at, or nearly at, a right angle."

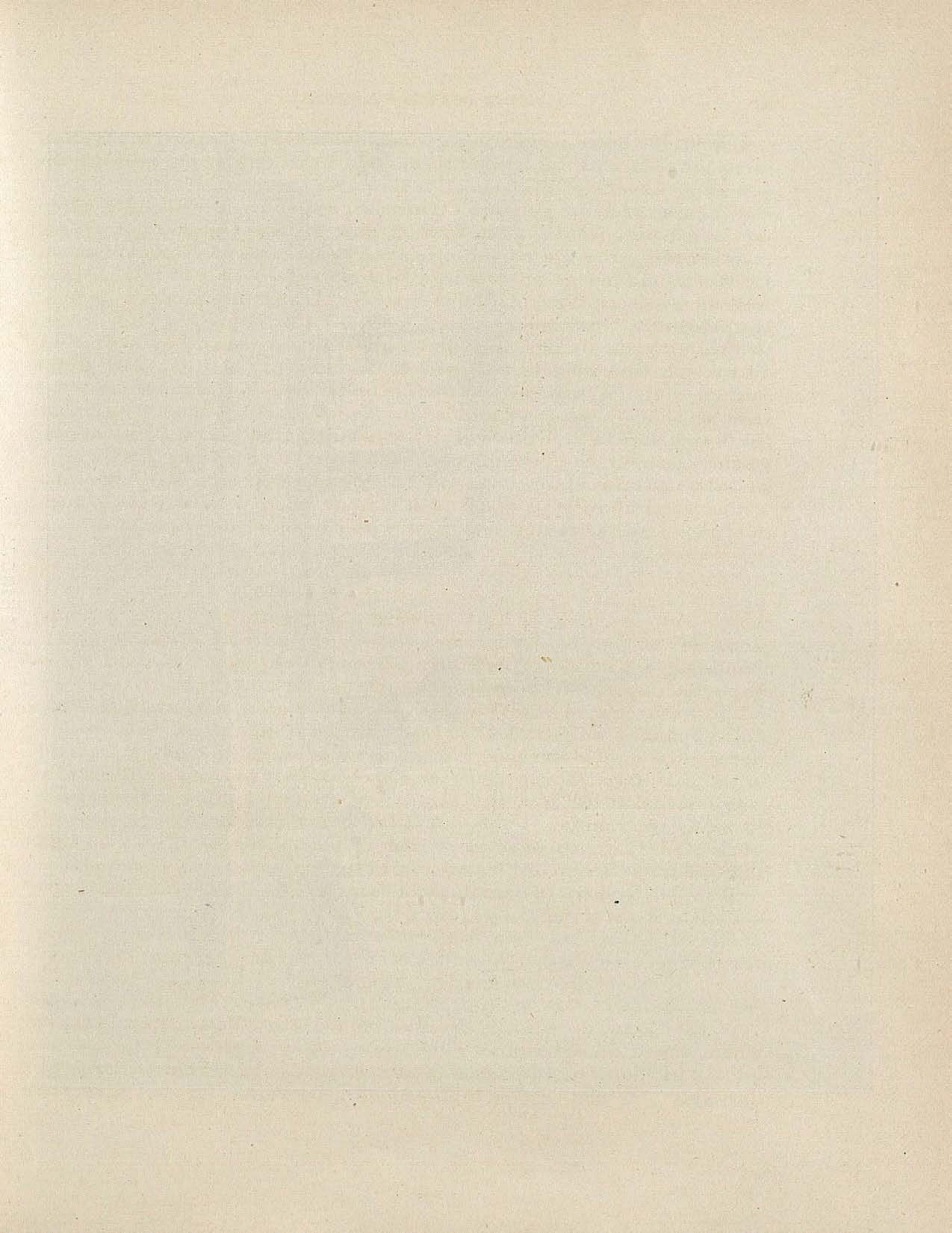
The Destroyer is armed with a submarine gun, discharging a very long explosive projectile. It has now been found that she is not likely to be of any service. One of the merchant steamers purchased by the Brazilian Government is armed with a pneumatic dynamite gun of the Zalinski system. Six Schichau torpedo-boats have been purchased in Europe.

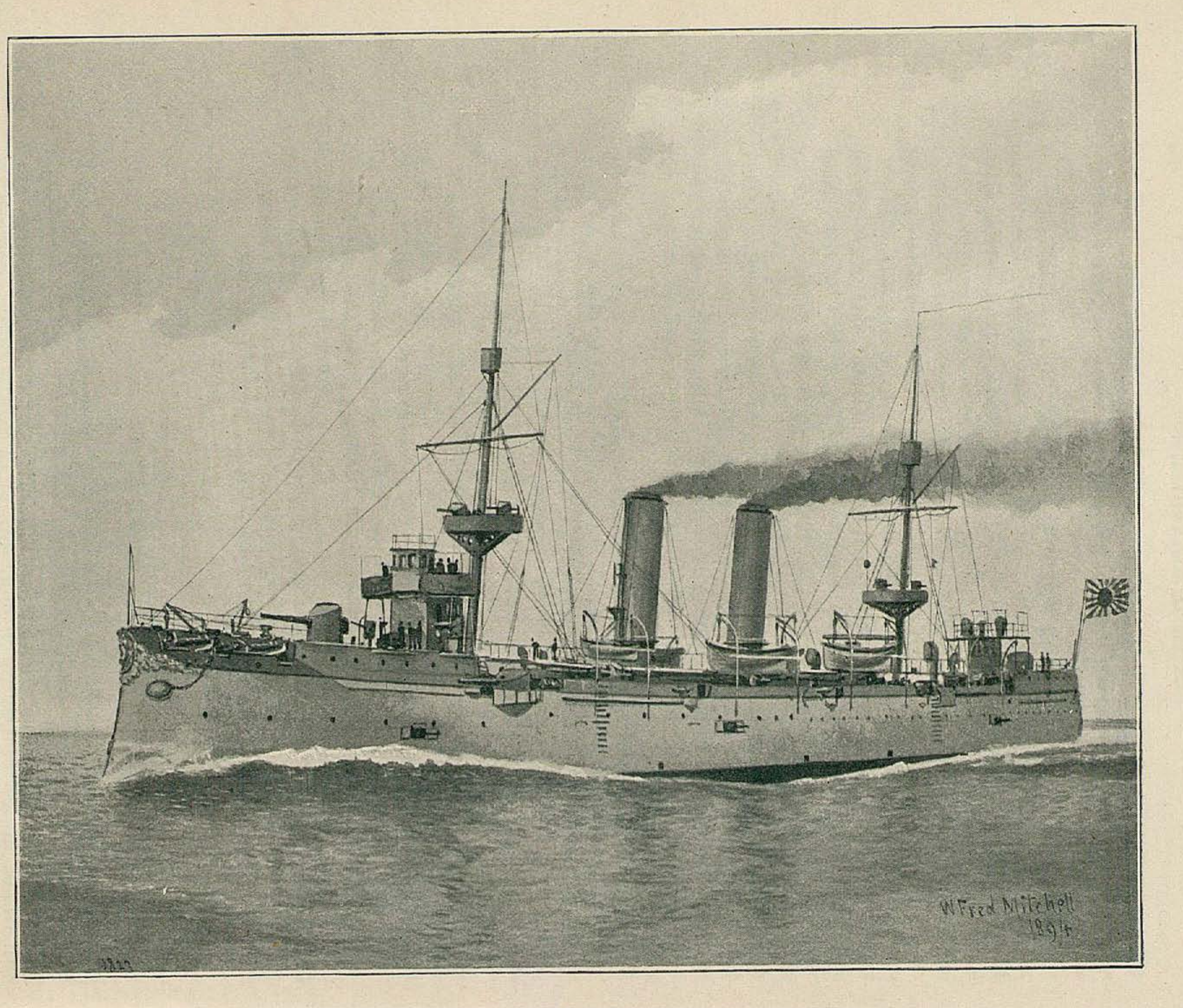
Almirante Barrozo.

The Almirante Barrozo, 1960 tons, 2200 horse-power, was lost off Rhas Gharis, in the Gulf of Suez, while making a voyage round the world, with a party of naval cadets on board. The crew, with one exception, were saved.

Chili.

At the Elswick yard, a cruiser, named the Blanco-Encalada, in remembrance of the ironclad destroyed by a torpedo in the Bay of Caldera in the Civil War, has been launched. She was designed by Mr. Watts. This vessel is of the same type as the 25 de Mayo, the





"YOSHINO."

JAPANESE CRUISER.

9 de Julio, and the Yoshino. Length, 370 ft. ; beam, 46 ft. 6 in. ; draught, 18 ft. 6 in. ; displacement, 4400 tons. She will be fitted with triple-expansion twin engines of Messrs. Humphrys, Tennant & Co.'s well-known make, to develop 14,500 indicated horse-power under forced draught, and propel her at 22½ knots per hour. Her bunkers will store 900 tons of coal, which would give the ship a wide radius of action at cruising speed. She is protected throughout her entire length by a steel deck, 1¾ ins. thick on the horizontal portion, and 3 ins. to 4 ins. thick on the slopes. The conning-tower is armoured with 6 ins. of steel. Armament: two 8-in. guns ; ten 6-in. quick-firing guns, twelve 3-pounders, twelve 1-pounders, and five 18-in. torpedo-launching tubes. The armament is thus superior to that of English and French cruisers of a similar class. In this connection, it may be remarked that the conditions of wind and sea with which the ships of the Chilian Navy have to contend are totally different from those which have to be taken into consideration for European vessels.

Chili has recently purchased a 20-knot torpedo-boat built in England.

JAPAN.

The cruiser Yoshino, 4150 tons, built by Messrs. Armstrong, Mitchell & Co., after the design of Mr. Philip Watts, has sailed for Japan, after brilliant trials. The plan of this vessel was suggested by that of the 9 de Julio, incontestably one of the most rapid cruisers afloat. The *Naval Annual* of 1893 gave the principal particulars of the Yoshino. The armament consists of four 6-in. guns, eight 4·7-in., and twenty-two 3-pounders, all quick-firing. The 6-in. guns are mounted one forward, one aft, and the two others on sponsons. The bow and stern guns have a range of 270 degrees, the guns in sponsons on the upper deck fire three degrees across the bow and 60 degrees abaft the beam. The 4·7-in. guns are in sponsons on the upper deck—two near the stern, the six others on the broadside. The 3-pounders are mounted, two in each top, two to each mast, eight on the bridges, etc., the remainder being distributed on deck in the most convenient places. At the measured mile trials the engines developed nearly 15,000 horse-power ; the mean speed, with forced draught, being 23·031 knots. The engines of the Yoshino are by Messrs. Humphrys, Tennant & Co. **Yoshino.**

The new Japanese torpedo-gunboat Tatsuta, which is being built by Messrs. Armstrong, was recently launched at Elswick. She is of steel, and has the following dimensions: length, 240 ft. ; breadth, **Tatsuta.**

$27\frac{1}{2}$ ft.; displacement, 875 tons. Estimated speed 20 knots, with an indicated horse-power of 5400. Her armament consists of two 4·7-in. quick-firing guns, four 3-pounders, and five torpedo-tubes. She has a full coal-supply of 200 tons.

The Japanese Government has determined to construct two ironclads, a cruiser, and a sloop. It is stated that one of the ironclads will be built at Elswick, the other and the cruiser at Yokosaka, and the sloop at Onohama. The Government and the Naval Administration have been violently attacked by a portion of the press, not only on the ground of these proposals, but owing to the alleged condition of the fleet and the types recently constructed.

CHAPTER III.

British Manœuvres in 1893.

The following was the Official Programme of the naval manœuvres of 1893:— Official Programme for 1893.

"1. The objects of the manœuvres are:—

"On the part of one side to obtain command of the sea between Great Britain and Ireland, and on the part of the other side to prevent this.

"2. Each of two opposing naval forces—the Red and the Blue—is divided into two separate fleets, stationed a certain distance apart. The Red side is, on the whole, stronger than the Blue; but one of the Blue fleets is stronger than one of the Red, and the two Blue fleets, if united, are together stronger than either of the Red. Each Blue fleet at the beginning of operations is nearer to one of the Red than the latter is to the rest of its own side. A force of torpedo-boats is attached to the Blue side. The Red side is to do its best to bring its opponent to action, either with its own forces combined or not, at the discretion of the senior admiral. If the Blue side has either been defeated, or has been compelled to retire to a distance to avoid an engagement, and the Blue torpedo-boats have been destroyed or reduced to inactivity, the admiral of the Red side is to report by telegraph if he considers that his side has gained command of the sea, so that a large expedition may be sent across it.

"3. The limits of the manœuvre area will be: On the north, 56° north latitude; on the south, 49° north latitude; on the east, the western coast of Great Britain and the south coast to 3° west longitude; on the west, 13° west longitude.

"The space between the parallel of 52° north and 52° 10′ north, extending from the 13th meridian west to the Irish coast, is to be considered a 'forbidden belt,' and is not to be crossed for manœuvre purposes.

"4. The coast of Great Britain south of 56° north latitude and round as far as 3° west longitude will be assumed to be the territory of the Red side.

"5. The Coast of Ireland will be assumed to be the territory of the Blue side.

"6. Islands will belong to the territory on the coasts of which they are situated, the Isle of Man being included in the territory of Great Britain."

Comparison with the Programme for 1892.

It will be seen at once that this programme, though bearing some external resemblance to that of the preceding year, differs from the latter fundamentally in its main strategical characteristics. In the manœuvres of 1892, the two fleets of a Naval Power, assumed to be unquestionably in possession of the command of the sea, were required to effect a junction in the comparatively narrow waters of the Irish Sea, one side of which, namely, the Irish, was supposed to be an enemy's territory, navally covered and occupied by a powerful but inferior sea-going fleet and a considerable force of torpedo-boats. The junction was effected with ease and complete success, and before the close of the operations the opposing fleet had been captured and the hostile torpedo-boats had been reduced to inactivity. If these results may be taken as approximately representing what would be likely to happen in actual war, under corresponding conditions as regards the relative strength and the strategical disposition of the naval forces opposed to each other, the broad lesson taught by the manœuvres of 1892 would seem to be that a superior naval force which commands the sea is not to be dislodged from nor even seriously molested in its command by a hostile sea-going force so inferior as to be incapable of trying conclusions in the open, even when the latter is supported by a considerable force of torpedo-boats operating in waters so narrow as to be accessible to them in all directions. In other words, a fleet strong enough to command the sea is, in spite of hostile torpedo-boats at large, master of an inferior fleet opposed to it, and having contained, captured, or destroyed the latter it can proceed at leisure and with certainty of ultimate success to neutralize the torpedo-boats, although it must in all cases carefully adapt its dispositions, both strategical and tactical, to the geographical conditions involved and the specific nature of the attack to be anticipated.

Command of sea not disputed, 1892.

Thus, throughout the manœuvres of 1892, the command of the sea was never seriously in dispute. It belonged from beginning to end to one of the naval forces engaged, and the only problem to be solved was whether the torpedo-boat factor employed in waters adapted to its operation is, or is not, capable of redressing the balance between two sea-going fleets one of which is largely superior to the other. It was found as a matter of fact that in such conditions the torpedo-boat factor hardly counted at all, and the only way to escape the conclusion to which this points is to assume either that the relative forces were unfairly proportioned, or that the inferior force was unskilfully

handled. We shall see in the sequel that the manœuvres of 1893 point to exactly the same conclusion though the relative forces were so differently distributed that the command of the sea, so far as it was held by either side, belonged rather to the force acting on the defensive than to the force required to act on the offensive.

Scheme of 1893 Manœuvres.

The fundamental difference between the manœuvres of 1892 and those of 1893 was that the command of the sea was in the latter case held to be in dispute from the outset. The Red side was on the whole superior to the Blue, but not so manifestly superior as to be in undisputed possession of the command of the sea. The Blue side on the other hand was not so inferior to the Red as to be unable with prudence to try conclusions with it in the open; and its slight inferiority might be supposed to be redressed, so far as the torpedo-boat factor was capable of redressing it, by a large force of torpedo-boats so disposed in ports of the Blue territory as to operate against the Red fleets in their endeavour to secure the command of the disputed waters of the Irish Channel. The Red Fleets which were required to secure the command of these waters were stationed respectively at Torbay and Lamlash. The Blue Fleets were stationed at Berehaven and Blacksod Bay, but by the artifice of the "forbidden belt," Ireland was converted into a peninsula extending beyond the western limits of the manœuvre field, so that the two Blue Fleets could only effect a junction of their forces by passing respectively round the south and north of Ireland and meeting somewhere in the Irish Channel. The A Red Fleet at Torbay was stronger than either the C Blue Fleet at Berehaven or the D Blue Fleet at Blacksod Bay; the B Red Fleet at Lamlash was stronger than the D Blue Fleet more immediately opposed to it, but weaker than the C Blue Fleet. The Two Red Fleets combined were stronger than the two Blue Fleets combined, but only very slightly stronger, this being an essential condition in a case where the command of the sea is assumed to be in dispute, since a marked superiority of force gives *ipso facto* the command of the sea to the fleet which possesses it, as history has repeatedly shown, and deters the inferior fleet from even attempting to try decisive conclusions with its adversary. The B Red Fleet was the nearest to the field of operations, but also most open, as soon as it left its anchorage, to the attack of the Blue torpedo-boats. It could easily reach the Irish Channel in advance of the D Blue fleet, starting simultaneously from Blacksod Bay, but in any case it would have to reckon with the Blue torpedo-boats stationed in the Irish ports of the Channel; and since the C Blue Fleet at Berehaven would under the same conditions of time be able to reach the Irish Channel in advance of the A Red Fleet starting simultaneously from Torbay, the B Red Fleet was

exposed to the double risk of encountering a superior hostile force to the southward, and of being placed between two fires if, declining an engagement with this superior force, it was driven back to the northward. Hence, under the conditions assumed to be existing, the task imposed on the Red Fleets was an extremely difficult one, and its execution might easily have involved one or both of the Red Fleets in overwhelming disaster.

Analogy with position of France and England in case of war.

The conversion of Ireland into a peninsula by the artifice of the "forbidden belt" naturally suggests the more or less direct analogy of the strategical position of France in the case of a naval war with England. France has two seaboards, the Mediterranean and the Atlantic, which are separated by the Iberian Peninsula. In the Mediterranean is the great naval arsenal of Toulon, the head-quarters of the French Mediterranean Fleet. In the Atlantic and on the French coasts of the Channel are Brest and other naval ports, from which a powerful sea-going squadron could issue, while the extra-Mediterranean ports of France are provided with a formidable force of torpedo-boats. On the assumption that France felt herself strong enough to dispute England's command of the sea, she might be expected to revert to the historic strategy of an attempt to combine her Mediterranean and Atlantic naval forces. To oppose this movement England would have, on the one hand, her Mediterranean Fleet—of which the so-called Channel Squadron may be regarded in the circumstances as a detached but strategically available contingent—and on the other a Channel Squadron, properly so-called, composed of ships mobilized in the home ports for the purpose. Without pressing the analogy too closely, it may be said that this situation was approximately reproduced in the manœuvres of 1893, the essential point to observe being that the command of the sea was not established, as in 1892, but avowedly in dispute, and that the relative strength of the opposing forces was for this very reason designedly placed very nearly on an equality.

Fleets engaged.

The Fleets engaged were composed, stationed, and commanded as follows :—

The Red side under the orders of Vice-Admiral H. Fairfax, C.B.

A Fleet at Torbay.

Vice-Admiral Fairfax.

Group a.	*Group b.*	*Group c.*
Royal Sovereign	Sappho.	Speedwell.
Rodney.	Pique.	Skipjack.
Nelson.	Naiad.	Salamander.
Conqueror.	Rainbow.	Niger.
Narcissus.	Intrepid.	Gossamer.
Blenheim.	Thetis.	Gleaner.
		Spider.
		Rattlesnake.

B Fleet at Lamlash.

Rear-Admiral E. H. Seymour, C.B.

Group a.	*Group b.*	*Group c.*
Anson.	Tribune.	Barracouta.
Thunderer.	Iphigenia.	Sheldrake.
Rupert.	Mersey.	Grasshopper.
Immortalité.	Iris.	
	Bellona.	
	Latona.	

The Blue side under the orders of Vice-Admiral Robert O'B. FitzRoy, C.B.

C Fleet at Berehaven.

Vice-Admiral FitzRoy.

Group a.	*Group b.*
Alexandra.	Terpsichore.
Superb.	Indefatigable.
Benbow.	Melampus.
Audacious.	Æolus.
Australia.	Spartan.
Galatea.	

D Fleet at Blacksod Bay.

Rear-Admiral A. T. Dale.

Group a.	*Group b.*
Swiftsure.	Andromache.
Hero.	Apollo.
Aurora.	Brilliant.
	Retribution.
	Forth.
	Thames.
	Pearl.

Blue Coast of Ireland Squadron.

Rear-Admiral H. C. St. John.

		Group c.
Vulcan.	Not grouped.	Barrosa.
Curlew.		Jason.
Magnet.		Circe.
Traveller.		Seagull.
Hearty.		
Raven.		

and twenty-four torpedo-boats—Nos. 34, 45, 52, 53, 57–60, 63, 64, 66–68, 72, 73, 77, 79, 80, 81–85, 87.

Torpedo-boat stations. The torpedo-boat stations were Larne, Belfast, Carlingford, Kingstown, Wicklow and Waterford. The stations were, by the rules, to be considered as too strongly fortified to permit of their being attacked, or the vessels in them, by the naval forces taking part in the operations, and a similar immunity was accorded to the ports of Dundalk, Strangford, Howth, and Wexford. The ungrouped vessels of the Blue Coast of Ireland Squadron were distributed among the torpedo-boat stations for the purpose of acting as "nurses" to the torpedo-boats attached to the same stations.

Relative strength of fleets.

The relative strength of the opposing forces was determined, not by the established Navy List classification of the several ships engaged, but by assigning a numerical co-efficient to each of the ships in the three groups *a*, *b*, and *c* above enumerated. The co-efficient or tactical value of each ship was, in group *a*, 12; in group *b*, 4; and in group *c*, 1. Thus the tactical values of the several fleets were as follows:—

——	Group *a*.	Group *b*.	Group *c*.	Total.
A. Red	72	24	8	104
B. Red	48	24	3	75
C. Blue	72	20	..	92
D. Blue	36	28	..	64

Conditions of a decisive action.

For a decisive action between squadrons or single ships it was necessary that the superior squadron or ship should be able to reckon at least one-eighth more points than its adversary. Other conditions were involved, but as no decisive action took place during the manœuvres these need not be considered. As the result of a decisive action, the beaten side would have been required to withdraw from the field of operations. All actions between forces not satisfying the numerical conditions of a decisive action were to be considered indecisive with the result that both sides were to be out of action for twenty-four hours after their respective arrival in one of their own ports.

Consequences of these conditions.

It will be seen that the A Red Fleet was superior to both its Blue adversaries, and might have fought a decisive action with either of them independently. The B Red Fleet, on the other hand, was superior to the D Blue Fleet, its nearest adversary, and inferior to the C Blue Fleet, being strong enough to fight a decisive action with the former independently, but liable to decisive defeat in an independent action with the latter. On the other hand, the two Red Fleets combined were just strong enough to fight a decisive action with the combined Blue Fleets; but if the latter were also combined with the four ships of group *c*, belonging to the Blue Coast of Ireland Squadron, the balance was reversed, and the tactical value of the combined Blue Fleets fell short by one point of the superiority required for a decisive action. Nevertheless, though subject to this disadvantage which no dispositions on their part could remove, the Red Fleets might at any time have detached all their vessels of

group *c* for independent operations against the Blue torpedo-boats without reducing their own tactical value to the point at which the combined Blue Fleets could have defeated them in a decisive action. All that the A Red Fleet had to fear if, with its group *c* detached, but its forces otherwise unimpaired, it encountered the C Blue Fleet independently, was an indecisive action. The B Red Fleet, on the other hand, might still have fought a decisive action with the D Blue Fleet, even with its group *c* detached. But the two Red Fleets combined could fight nothing but an indecisive action with the combined forces of the Blue side, and had nothing worse than an indecisive action to fear even if they fought with their group *c* detached.

Alternative courses of action.

An attentive consideration of these figures, and of the conditions strategical and tactical involved in them, would seem to show that the main object of the Blue commander must in all circumstances have been to concentrate the whole of his force in the disputed waters as soon as possible, and therefore that the main object of the Red commander should have been to prevent this concentration. Unless he could prevent it, and until he had prevented it, it was no advantage to him to concentrate his own forces, since in that case the only result would be an indecisive action between the combined Red and Blue sides, ending in a deadlock from which there was absolutely no issue. The alternatives were for the Red fleets to combine at once or to act independently, with the object of preventing the concentration of the Blue forces. The former was extremely precarious in the conditions, and might lead to crushing disaster, while it could lead to no decisive advantage unless it succeeded in preventing the concentration of the Blue forces. The latter was certainly not without its risks, but it offered the B Red Fleet a fair prospect of defeating the D Blue Fleet in a decisive action before the C Blue Fleet could come to the succour of the latter, while it exposed the A Red Fleet to no greater risk than that of having to fight an indecisive action with the C Blue Fleet independently, giving it at the same time a fair chance of defeating it in detail by a timely combination with the B Red Fleet after the latter had disposed of its immediate adversary.

Commencement of hostilities. Cruisers sent to sea.

So much being premised, it will be convenient now to consider the actual course of the operations, and then, by way of criticism, to contrast their results with those which might have been expected to follow from such alternatives as seem naturally to suggest themselves. After a week's preliminary exercises at sea the several fleets proceeded to their respective stations already enumerated. In the course of July 26 permission was simultaneously given for "cruisers to observe probable hostile movements." Squadrons of cruisers were

forthwith despatched by all the fleets to convenient posts of observation; but as, with one exception, their movements and observations had no important strategical results, they need not be specified in detail. The exception was the detachment, on the afternoon of July 26, of the Blenheim and Narcissus accompanied by the Sappho from the A Red Fleet, under cover of the permission given for cruisers to observe probable hostile movements. The Blenheim and Narcissus are, of course, properly speaking, cruisers, but for the purpose of the manœuvres they were given the tactical value of battleships, and they were really detached before the beginning of hostilities, not for the purposes of observation, but with the manifest object of reinforcing the B Red Fleet. In other words the Red commander rightly or wrongly considered himself entitled, before hostilities began, materially to alter the relative strength assigned by the Admiralty to the several fleets engaged, by largely reinforcing the B Red Fleet and bringing its group *a* up to a level with that of the C Blue Fleet. The object undoubtedly was to enable the B Red Fleet to hold its own in case it encountered the C Blue Fleet, as was likely enough, before the main body of the A Red Fleet appeared on the scene. It is evident, from the brief accounts of the manœuvres just published by the Admiralty, that such a proceeding was not considered by the umpires to be in accordance with the spirit or even with the letter of the rules.

Main fleets put to sea.

In the afternoon of the 27th July the following telegram was sent by the Admiralty to the Admirals commanding the four fleets; "Manœuvres are to begin at 10 P.M. on the 27th, and end at 10 P.M. on the 6th August." This telegram was received by each fleet almost simultaneously between 6 and 7 P.M. By three of the Admirals who received it it was understood to mean that the fleets under their command were not to leave the anchorages assigned to them before the hour named in it for the beginning of the operations; nor is it easy to reconcile any other interpretation of it with the specific statement of the official scheme of operations that "each of two opposing Naval Forces—the Red and the Blue—is divided into two separate Fleets, *stationed a certain distance apart.*" The distance apart at which the allied Fleets of each side were stationed at the outset was thus officially declared to be an essential feature of the operations, and so it was understood by three of the Admirals engaged. Accordingly, the two Blue Fleets and the B Red Fleet remained at their anchorages until the time appointed—10 P.M.—and left them precisely at that time. The telegram was, however, differently interpreted by the Admiral in command of the A Red Fleet. He received it shortly after 6 P.M., and immediately proceeded

to sea, some of his ships being already under weigh when the telegram was received. This is another matter which must have been brought to the attention of the umpires, but their published report is silent on the point, though that of the Admiralty points, not obscurely, to the nature of the umpires' opinion. It must be obvious, indeed, to any one who considers closely the language of the scheme of operations, that to anticipate by 3½ hours the time fixed for the beginning of the operations was to snatch an illegitimate advantage by straining the letter of the official programme and completely ignoring its spirit.

Time required for fleets to reach Irish Channel.

Berehaven is distant about 180 miles from Carnsore Point, at the south-western corner of the Irish Channel, and Torbay is about 270 miles from a line drawn between Carnsore Point and St. David's Head. The speed of a fleet is determined by that of its slowest ship, and hence, as the C Blue Fleet included the Audacious whose *maximum* speed at sea cannot be estimated at much more than 10 knots, Admiral FitzRoy, starting from Berehaven at 10 P.M. on the 27th July, could not expect to enter the Irish Channel much before 4 P.M. on the 28th July. On the other hand, as the A Red Fleet included the Nelson, whose *maximum* speed may be taken as about 12 knots, Admiral Fairfax, starting from Torbay at the same time, could not enter the Irish Channel until some four hours after Admiral FitzRoy might be expected to reach it. Hence, but for the premature departure of the A Red Fleet from its anchorage, Admiral FitzRoy must have entered the Irish Channel several hours in advance of Admiral Fairfax, assuming that they both made direct for the appointed scene of operations. As a matter of fact, they both did this ; but Admiral FitzRoy being somewhat delayed by a thick fog on the south coast of Ireland, and Admiral Fairfax having (as we have seen) left Torbay 3½ hours before the appointed time, the two fleets sighted each other in the neighbourhood of Carnsore Point shortly before 4 P.M. on the 28th July ; but a thick fog again coming on they lost sight of each other almost immediately.

Blenheim and Narcissus.

This, however, was not the only nor the most important incident which occurred in the neighbourhood of Carnsore Point on the afternoon of the 28th July. The Blenheim and Narcissus when detached by Admiral Fairfax, under the guise of observing cruisers on the 26th July, were ordered to join the cruiser squadron, previously despatched, off Milford Haven and proceeding to St. Ann's Head, there to await a telegram informing them of the hour fixed for the beginning of hostilities. This telegram they received towards evening on the 27th. By this time the engines of the Narcissus had broken down, and she was sent into Milford Haven for repair,

remaining there in a disabled condition until the manœuvres were virtually at an end. The Blenheim, with the rest of the detached cruisers, stood away for the night in a south-westerly direction to avoid the attacks of the enemy's torpedo-boats, which might be expected as soon as hostilities began, and returned at daybreak to a rendezvous off St. Ann's Head; being further instructed to look out for the B Red Fleet and await it in the afternoon of the 28th at a rendezvous in the neighbourhood of Carnsore Point.

B Red Fleet.

In the meanwhile, the B Red Fleet had at the appointed hour on the 27th quitted its anchorage at Lamlash and, acting under instructions received from Admiral Fairfax, had shaped a direct course for the rendezvous just mentioned, off Carnsore Point, proceeding at a speed of 12 knots, which was the utmost that the Rupert could accomplish. In this operation the B Red Fleet was necessarily exposed to a formidable attack of torpedo-boats placed athwart its course in the narrower parts of the Irish Channel, and a brisk engagement, which began at 12.45 A.M. on the 28th and was renewed at 1.30 A.M., resulted in losses on both sides; but as these results were not determined by the umpires until some days later they did not affect the immediate course of the operations, and may, therefore, be reserved for separate consideration. Having disposed of the torpedo-boats which disputed its passage, the B Red Fleet had a clear course for proceeding to the appointed rendezvous with Admiral Fairfax. The C Blue Fleet, starting from Blacksod Bay at the same time that the B Red Fleet left Lamlash, would necessarily be some 200 miles behind the latter, a distance which would tend to increase as the speed of the Swiftsure, Admiral Dale's flagship, was not likely to exceed 10 knots. Accordingly the Blenheim and her consorts were sighted by the B Red Fleet about 4 P.M. on July 28th, and almost immediately afterwards the two Red Fleets were united with almost their complete force, the Narcissus alone being absent. Unfortunately for the Red side, however, fortunately perhaps for the Blue side, the Red Fleets were scarcely united and had not had time to assume a combined formation when they were enveloped in a dense fog, which lasted until nightfall.

Action of July 29th.

The C Blue Fleet, which had been sighted by the A Red Fleet before the fog came on, proceeded on its course during the fog towards a rendezvous appointed with the D Blue Fleet. The combined Red Fleets shaped a course for pursuit, and some of the Blue cruisers narrowly escaped an engagement with some of the Red ships, but were saved by the thick weather. Admiral FitzRoy's signal guns were heard from the Red Fleet during the prevalence of the fog, but he was no longer in sight when the weather cleared. On

the other hand, the signal guns of the Red Fleet attracted some of the Blue torpedo-boats to its neighbourhood, and three Red cruisers—the Sappho, Thetis, and Pique—were successfully attacked and put out of action, some of the attacking boats being, however, put out of action at the same time. In the course of the night, about 2 A.M. on the morning of July 29th, the two Blue Fleets were united in the neighbourhood of the Isle of Man. Shortly afterwards the combined Fleets of both sides came in sight of each other, and as Admiral FitzRoy, with his forces combined,* had now no object in declining an action, an indecisive action was fought in the early hours of the morning of July 29th. This action was magnificent as a spectacle, and not without some tactical interest; but its strategical results were *nil.* In fact the whole strategical interest of the manœuvres was eliminated from the moment when the Blue Fleets effected their junction. From that moment the tactical values assigned to the two sides respectively made it impossible for the Red side to discharge the function assigned to it of attempting "to obtain the command of the sea between Great Britain and Ireland." The Blue side had in fact discharged its assigned function of preventing this, though it had certainly not itself obtained command of the disputed waters as Admiral FitzRoy, perhaps rather hastily, claimed for it.

Action of August 4th.

The remaining history of the manœuvres may be dismissed in a very few words, the performances of the torpedo-boats being reserved for separate treatment. As a result of the indecisive action fought off the Calf of Man on the morning of July 29th, both sides were required by the Rules to be out of action for twenty-four hours after their arrival in one of their own ports. The Blue Fleets retired to Belfast and the Red Fleets to Milford Haven. At the conclusion of the period of armistice, the Blue Fleets cruised in the disputed waters, and the Red Fleet kept at a respectful distance, having no object in seeking an action which the tactical values assigned to the two sides must render indecisive. The Blue torpedo-boats were active, but not particularly successful in their attacks, and on the morning of August 4th, the two sides again came into contact in Carnarvon Bay, when another general action was fought, again magnificent as a

* The cruisers of group *c* belonging to the Blue, coast of Ireland, Squadron had not yet joined Admiral FitzRoy's flag. But Admiral Fairfax had been deprived of the Narcissus, which was disabled and under repair at Milford, and of the Thetis, which, having acknowledged herself torpedoed on the previous evening, was out of action and absent. Hence Admiral Fairfax had no decisive superiority; and even if Admiral FitzRoy was not aware of this, it may be conjectured that he had resolved to risk an action relying on an appeal to the umpires, whose award might be expected to impose some disqualifying penalty on his adversary for his alleged breaches of the rules.

spectacle, again presenting some incidental features of tactical interest, and again totally devoid of strategical result.

The "Fleet in being."

It was during the interval between these two general actions that Admiral FitzRoy, having seen nothing of the Red Fleet since the action of July 29th, telegraphed to the Admiralty, "I consider that I have command of the Irish Sea, and that no expedition can cross it." On this claim a writer in the *Quarterly Review* for October, 1893, has commented as follows: "With all respect for a very distinguished naval officer, we must express the opinion that this was a gratuitous misreading of a very important principle of naval warfare. It confounded the condition of a disputed with that of an assured command of the sea. It is true that the Red Admiral was not in a position to defeat the Blue Fleets, nor to compel them to retire to a distance in order to avoid an engagement. So far, he himself had failed to secure the command of the sea, and assuredly in such circumstances no expedition could have been sent across it. The latter part of Admiral FitzRoy's telegram was therefore perfectly correct, but except in this sense, he had no more secured the command of the sea than his adversary had. He had denied to his adversary that strategic freedom of transit which constitutes command of the sea, but he had failed to secure it for himself. He had not defeated the Red Fleets, nor compelled them to retire to a distance to avoid an engagement; and this criterion applied by the Admiralty to the Red Fleets, applied with equal force to his own. The very circumstances which made it impossible for the Red side to send an expedition across the Irish Sea, would have made it equally impossible for the Blue side to send an expedition across in the opposite direction, or to carry out any important naval enterprise against the coasts of its adversary. The presence on either side of an undefeated naval force within striking distance rendered the despatch of any such expedition reciprocally impossible. There was no command of the sea on either side, but the exact negation of it on both sides."

Disappointing results of manœuvres.

The manœuvres were virtually ended at the close of the second general action. Before the period of armistice entailed by an indecisive action was concluded, the Admiralty ordered the operations to be brought to a close. It must be acknowledged that the results attained were scarcely commensurate in importance with the magnitude of the forces employed. To set four powerful fleets, stationed hundreds of miles apart, in strategic movement, and to produce a deadlock from which there is no issue within thirty-six hours of the opening of hostilities, is a result which seems to indicate either that the original scheme of operations was radically unsound or that its execution was radically misconceived. The former alternative found

most favour with the majority of critics at the time; but a further consideration of all the circumstances of the case may fairly be held to show that the dispositions of the Red commander really led to the deadlock which ensued. It was essential to the success of his dispositions that the A Red Fleet with or without its consort, the B Red Fleet, should be able to intercept the C Blue Fleet at or near the southern entrance of the Irish Channel, and therefore at a point which the D Blue Fleet, coming from Blacksod Bay, could not have reached at the time. It was only possible for the A Red Fleet to do this if it left Torbay, as it did, some three or four hours before the C Blue Fleet left Berehaven. If Admiral FitzRoy had left Berehaven at 6.30 P.M. as Admiral Fairfax, in accordance with his own interpretation of the rules must have expected him to do, the C Blue Fleet must have passed Carnsore Point three or four hours in advance of the A Red Fleet, and must in all probability have encountered the B Red Fleet in circumstances leading to the decisive defeat of the latter; for, although the B Red Fleet might have been reinforced by the Blenheim and her consorts in time—supposing the latter to have escaped the Blue torpedo-boats during the preceding night—it is plain from the Admiralty Report that this reinforcement would have been disallowed by the umpires on appeal. Thus it appears that the dispositions of the Red commander could only be successful on the condition that, while he interpreted his instructions in one way, his adversaries would interpret them in another. They would probably have been successful in the actual event if they had not been unexpectedly frustrated by the weather, and this circumstance is not, perhaps, without its valuable lessons. But none the less the Red commander, by his interpretation of the rules, was really responsible for the deadlock produced.

Suggested dispositions for Red side.

The essential features of the scheme of operations appear to have been two; first, that the tactical values assigned to the several fleets were such that a concentration of the Blue forces would render the task assigned to the Red side impossible of execution; and secondly, that the original disposition of the fleets was such that the C Blue Fleet must be able to enter the Irish Channel some three or four hours in advance of the A Red Fleet, its nearest adversary. The first condition made it clear that the only chance of success for the Red side lay in its capacity to prevent the concentration of the Blue forces; the second would seem to indicate that the best way to do this was for the Red Fleets to act, in the first instance, independently and not in combination. To attempt to combine them at the outset was to expose the B Red Fleet to the risk of decisive defeat at the hands of the C Blue Fleet—a risk which it is clear

that the Red commander thought he could only avert by an artifice of questionable or more than questionable legitimacy. In default of such an artifice, the Red Fleet must have been exposed to extreme hazard and almost certain defeat, and this consideration seems in itself to disallow the expedient of Red combination at the outset. The alternative plainly was for the B Red Fleet acting independently to endeavour to defeat the D Blue Fleet in a decisive action before the C Blue Fleet could reach the scene of the engagement. As immediate concentration was essential to the success of the Blue side, it was to be anticipated that the D Blue Fleet would at once make the best of its way to the Irish Channel, as in fact it did. The B Red Fleet was, however, very conveniently stationed for intercepting Admiral Dale on his passage round the north coast of Ireland. Instead of attempting this, Admiral Seymour was withdrawn by his superior officer from his position of advantage in the north, and ordered to proceed with all despatch to a southern rendezvous with the A Red Fleet, with the results which have already been described. Had he been free to operate independently against Admiral Dale, he might, by a judicious disposition of his cruisers, have made practically certain of coming in touch with the D Blue Fleet in circumstances which should have led to its decisive defeat, or at least have compelled it to return to Blacksod Bay, where it might have been blockaded. It is true that the operation suggested might have required Admiral Seymour to take his fleet through the North Channel at night, and thereby have exposed him to torpedo attack in circumstances calculated to give the Blue torpedo-boats every advantage. But this risk was not appreciably greater than that which he actually had to run in passing between Belfast and the Mull of Galloway, and, if necessary, it might have been avoided altogether by remaining at Lamlash till daylight and taking due measures to repel a torpedo attack on that anchorage, or by retiring up the estuary of the Clyde for the night, if the double entrance to Lamlash Bay was held to offer too great an advantage to the attack of the Blue torpedo boats. It has moreover already been pointed out that some of the Red vessels of group *c* might have been very effectively employed from the outset in independent operations against the Blue torpedo-boats without so lowering the tactical value of the Red Fleets as to impair their several capacity to fight a decisive action against their respective nearest adversaries. As the North Channel is some 200 miles from Blacksod Bay, it was certain that the D Blue Fleet steaming at 10 knots an hour could not reach it until some 20 hours after the beginning of the operations, and it would be Admiral Seymour's interest to intercept it as near

to the North Channel as possible, so as to take advantage of his superior speed in chasing it back to the westward. Having thus defeated or "contained" the D Blue Fleet, Admiral Seymour might safely have awaited the further development of events at some convenient rendezvous off the north-west coast of Ireland, distant not less than 700 miles from Torbay. By dispositions of the nature indicated it would have been in the power of the Red commander so to place what may be called the centre of strategic moment that it could not be reached by the Blue commander in advance of himself, although the latter had the advantage at the outset of being stationed some ninety miles nearer to the southern entrance of the Irish Channel. The distance from Berehaven to Blacksod Bay by the route which the C Blue Fleet would be compelled by the forbidden belt to take is about 600 miles, that is 60 hours' steaming at an average speed of 10 knots. In the same time the A Red Fleet would steam 720 miles, at an average speed of 12 knots; so that, assuming Admiral FitzRoy to steam direct for Blacksod Bay, he would be overtaken by Admiral Fairfax at a point some 20 or 30 miles short of it. In any other alternative he would have been exposed to the risk of defeat in detail somewhere in the Irish Channel—always supposing that the Red cruisers of group *c* were so handled as to keep the Blue torpedo-boats more or less at bay, and thereby to secure for the A Red Fleet a field of operations comparatively unhampered.

It is not to be denied that the general dispositions here suggested would have been exposed to many risks and contingencies of dislocation; but such risks and contingencies are inherent in the very nature of naval warfare, and must be inseparable from any scheme of manœuvre operations which is designed, as it ought to be, so as to reproduce as many of the conditions of actual warfare as possible, and at the same time to give each side a fair prospect, but no certainty, of success. It may at any rate be urged that the dispositions suggested appear to be plainly indicated by the essential features of the scheme of operations, and based on the common-sense principle that what it is the prime interest of one side to do it ought to be the prime purpose of the other side to prevent. If, after all, they had failed, they would at least have taught the important lesson—a lesson of vital moment to the nation—that the command of the sea is not to be secured by a naval force only slightly superior to its adversary. As the manœuvres were actually conducted, they taught no serious lesson at all. Advantages and disadvantages thereof.

It remains to consider the operations of the Blue torpedo-boats. We have seen that the Red cruisers of group *c* were not directly Operations of torpedo-boats.

and independently employed, as some of them at any rate might have been, in an active campaign against the torpedo-boats and their stations. They were of no tactical value to the Red commander after the concentration of the Blue forces had been successfully effected, since, even with his whole force unimpaired, he was not in a position to fight a decisive action against the united Blue forces, nor would the absence of the whole of his group *c*, as well as of the Narcissus, disabled throughout the operations, have rendered him so inferior to the Blue side as to place the latter in a position of decisive superiority. The Narcissus counted 12 and the Red group *c* 11, so that their simultaneous absence would have reduced the combined Red strength to 156; but as the combined Blue strength was only 160, the Red strength might have been reduced to 145 without placing the Blue side in a position to fight an action on terms of decisive superiority. Hence, there was nothing to be gained by keeping the Red group *c* in company with the main body of the Red Fleets, and they might have been detached for the purpose of harrying the Blue torpedo-boats. Three of them, indeed, the Speedwell, Spider, and Skipjack were so detached, but being surprised by the Brilliant at Holyhead, on July 31st, they were put out of action. Hence, the Blue torpedo-boats enjoyed for the most part an unmolested field of operations. It is instructive to note how they employed their opportunities. Their real opportunity was their first when the B Red Fleet had to pass about midnight through the narrow channel between Belfast and the Mull of Galloway. Here a large force of torpedo-boats was assembled to dispute its passage, the B Red Fleet being disposed in an order not specially adapted to the purpose of repelling or evading an anticipated torpedo-boat attack. It was arranged in three columns line ahead, the front of the columns being covered by a detachment of light cruisers. This disposition entailed frequent signalling by means of the flashing lantern, a proceeding which gave the torpedo-boats timely information of the whereabouts and advance of the fleet. Had the fleet been disposed in single column line ahead in tolerably close order, with scouts in front, all signalling might have been dispensed with, as the rear ships in the column would only have had to keep station, and to follow closely the motions of the leader. However, the passage was effected in an order which seemed to imply that the fleet could afford to neglect the attacks of torpedo-boats altogether, relying on its speed to shake them off, and on the precision of its fire to destroy them before they came within striking distance. This confidence was not entirely justified by the result. The attack and defence were both spirited and resulted in the presentation of a large number

of claims and counter-claims to the umpires. The adjudication of such claims is necessarily a matter of extreme difficulty and complexity, and its results are seldom regarded by either side as satisfactory, especially when, as happened in some cases, the award, for which no reasons were assigned, and from which there was no appeal, was issued before the umpires had had the opportunity of considering the evidence of both sides. But the decisions of the umpires being final, and issued without reasons, it is idle to attempt to discuss them on their merits. The only safe and fair course is to take them as they stand as a rough and ready approximation to the abstract justice of the case, in which any disadvantage which one side may deem itself to have suffered in one case is likely in the long run to be balanced by a corresponding disadvantage inflicted on its adversary in another. The net result of the action off the Mull of Galloway on the night of July 27–28 was that the Thunderer and the Tribune were adjudged to have been put out of action by torpedoes, with a loss to the assailants of six torpedo-boats put out of action by the fire of the fleet. This was undoubtedly a very serious injury inflicted on the Red side, but the balance of advantage was to some extent redressed by the almost simultaneous destruction in the North Channel of two of the Blue cruisers, the Forth and the Apollo, by torpedo-boats of their own side. The destruction of the Sappho, Pique and Thetis by Blue torpedo-boats off Carnsore Point on the afternoon of July 27 has already been incidentally mentioned.

Torpedo-boats destroyed.

Thus the Red Fleets in effecting their junction lost one battleship and four cruisers by the attack of the Blue torpedo-boats. In the corresponding operation of the Blue side, which was not exposed to the attack of hostile torpedo-boats, two cruisers were destroyed by a mistake which is not unlikely to arise in actual warfare. These results were attained at a further loss to the Blue side of seven torpedo boats, six—four first-class and two second-class—being awarded out of twenty-two claims to the B Red Fleet and one to the Narcissus on July 28th. In the subsequent operations the claims and counter-claims were frequent and very confusing. Two Red cruisers, whose names were not ascertained, were claimed on August 3rd, when the combined Red Fleets cruising in the Irish Channel were hotly attacked by a large force of torpedo-boats, and these two claims, out of many others advanced, were allowed by the umpires. On the other hand, the Blue side lost another cruiser, probably the Melampus, put out of action by her own side; and by the end of the operations no less than twenty-seven Blue torpedo-boats were adjudged by the umpires to have been put out of action in a

confused series of encounters which it is not necessary to examine in detail. The actual number of first-class torpedo-boats employed was twenty-four; but we have seen that two second-class boats supplied by the Vulcan were put out of action in the night of July 27–28, and in some cases the same torpedo-boat was put out of action more than once, having spent the prescribed interval of forty-eight hours in the protected seclusion of one of its own ports.

Cost of torpedo-boat successes.

This result is really of transcendent importance. The whole period of hostilities extended over less than eight days—from 10 P.M. on July 27th until the evening of August 4th, that is for only 188 hours in all. During 32 of these 188 hours the whole of the Red side was out of action as a consequence of the two indecisive engagements of July 29th and August 4th; and during those 32 hours it was both unassailable and incapable of acting on the offensive. Hence it appears that the 27 torpedo-boats were really put out of action in 5½ days, or at the rate of very nearly five a day. Of course, in actual warfare, a torpedo-boat put out of action means a torpedo-boat destroyed once for all. Hence, if the manœuvres of 1893 can be regarded as representing, even approximately, what would occur in actual warfare, this means that a fleet operating in waters accessible to an enemy's torpedo-boats might expect its assailants to perish at the rate of something like four a day. As was remarked at the time by one of the correspondents of the *Times*, "a simple arithmetical calculation founded on these *data* would enable us to ascertain how long it would take to suppress any number of torpedo-boats directed against us in actual warfare by an enemy who elected to rely on that particular weapon. It is important to observe that the destruction of the Blue torpedo-boats . . . . has been effected not so much by an active and offensive defence specially directed against them, as to a very large extent by their own failure to accomplish the objects they aimed at." The torpedo-boat successes of the Blue side were evaluated by the umpires as one battleship, the Thunderer, and six second-class cruisers, the Tribune, Sappho, Thetis, Pique, and two others whose names were not ascertained. Against these must be set the Blue losses of three second-class cruisers, the Forth, Apollo, and probably the Melampus, so that the net balance stands as follows—one battleship and three second-class cruisers against twenty-seven torpedo-boats destroyed at the rate of very nearly five a day. "In scoring this amount of success," says the correspondent above quoted, "the torpedo-boats have committed suicide in large numbers. In other words they have suppressed themselves by their own temerity."

Performances of torpedo-gunboats.

It has already been remarked more than once that the Red cruisers of group *c*, which were all of them nominally classed as torpedo-boat-catchers, were by no means largely employed in catching or suppressing the Blue torpedo-boats. This was partly due, as has also been pointed out, to what appears to have been a mistaken estimate of their tactical value by the Red commander, who seems to have supposed that, by retaining them in company or within reach of speedy recall, he could perchance establish a decisive superiority over his united adversaries. But it was, perhaps, at least as much due to the fact that, with very few exceptions, they were found to be quite incapable of acting as efficient catchers of torpedo-boats. This very serious defect in an important branch of our naval equipment is now, it may be hoped, in the way of speedy and effective remedy, by reason of the resolve of the Admiralty to build forthwith a large number of improved catchers, of which one, the Havock, has already proved herself to be thoroughly efficient at sea. But the failure of the existing catchers is a very serious matter, although, as we have seen, it was possible for the torpedo-boats to be destroyed very rapidly without their intervention. "The majority of these vessels," wrote the correspondent already quoted on 2nd August, "are a complete failure. They are a perpetual source of anxiety to the commander of a sea-going fleet. Two or three are at this moment away and undergoing repairs. They are incessantly breaking down, and their speed at sea constantly falls short of their nominal speed on paper by as much as 30 or 40 per cent. The Grasshopper failed yesterday to overhaul a runaway torpedo-boat. The Niger, the newest and largest of them all, was unable, a few days ago, to keep up with the Royal Sovereign at a speed of less than 15 knots; and with the possible exception of the Rattlesnake there is not one of them that can be relied on with certainty to discharge the proper functions of a torpedo-catcher. For this reason . . . the work of suppressing the Blue torpedo-boats has been mainly accomplished by the Blue torpedo-boats themselves and not by the Admirals in command of the Red Fleets. This result alone appears to me to be one of almost incalculable importance in its bearing on the real value of the torpedo-boat factor in the strategic conflict of sea-going fleets." This statement appears to be justified by the experience—more or less exceptional, perhaps—of the manœuvres. It is certain that the existing vessels of this class are very delicate instruments and need to be handled with peculiar care, especially when their officers and crews are new to them. But when in permanent commission their record is less disappointing. That they are excellent sea-boats is unquestionable. It will be recollected that the Gleaner crossed the

Bay of Biscay in a gale which caused the Resolution to turn back. The satisfactory performances of the Speedwell, attached to the Channel Squadron, prove that she represents a very valuable class of auxiliaries to a sea-keeping fleet. Though their speed may be insufficient to enable them to deal with torpedo-boats in waters specially favourable to the operations of the latter, they would probably give a very good account of torpedo-boats operating on the high seas in association with sea-going fleets.

Lessons of the manœuvres. Thus the continuous experience of three years' manœuvres, those of 1891, 1892, and 1893, would seem to show that the sea-going torpedo-boat is an overrated weapon of offence. In 1891 the late Admiral Long showed, as was pointed out in the *Naval Annual* of last year, "that an active defence adequately organized and skilfully disposed must in the end completely neutralize the offensive capacity of the torpedo-boat." This demonstration was reinforced by the manœuvres of 1892, which also showed further that the extinction of the torpedo-boat menace follows immediately on the destruction of the shelter provided for the hostile torpedo-boats and on the surrender of the sea-going squadron to which they are attached as auxiliaries. Lastly, the manœuvres of 1893 completed the demonstration by showing that, even in default of an active defence adequately organised and skilfully disposed, torpedo-boats are very apt to suppress themselves and to attain a very high rate of extinction in the normal course of their attacks on a powerful and vigilant sea-going adversary. The truth seems to be that a torpedo-boat ought properly to be regarded not as an independent sea-going unit of naval force, but as a peculiar and very destructive kind of projectile with a very extended range which varies according to circumstances, but is by no means unlimited in any circumstances, and with an intelligent power of altering its direction in the course of its flight, but also with a considerable liability to be destroyed or intercepted before it attains its mark. As such its menace is tremendous, and its influence on all strategical dispositions within its range is dominant and decisive so long as its menace is unabated. But experience, now repeatedly tested in our own and other navies under conditions as closely analogous to those of actual warfare as peace manœuvres can be made to afford, would seem to have shown that its strategic menace is far more formidable than its real offensive capacity, and that, regarded as a projectile, it is endowed with a really remarkable capacity for hitting wide of the mark and destroying itself before it has delivered its blow—to say nothing of its very awkward habit of occasionally mistaking a friend for an enemy.

JAMES R. THURSFIELD.

CHAPTER IV.

FOREIGN MANŒUVRES.

I.—France.

The most important foreign manœuvres of last year were those of France and Italy, and, fortunately for English readers, both have been described in full detail, with the aid of information derived from a variety of authentic sources, by Commander H. Garbett, R.N., in the pages of the *Journal of the Royal United Service Institution.* Considerable use of the materials compiled by Commander Garbett will be made in the following commentary, and the writer desires to acknowledge his especial, but not exclusive, indebtedness to the very valuable labours of that officer. **Sources of information.**

Two series of French manœuvres were carried out independently in the Mediterranean and the Channel. Those in the Mediterranean will first engage our attention. The fleets organised for the purposes of the manœuvres were formed of the Active and Reserve Mediterranean Squadrons, and were composed and commanded as follows: **The French Mediterranean manœuvres.**

Active Squadron:—

1st Division.—Battle-ships: Formidable, flagship of the Commander-in-Chief, Courbet, Redoutable.
1st class battery cruiser: Cécile.
Torpedo-cruisers: Faucon, Vautour.
Torpedo-gunboat: Léger.
Sea-going torpedo-boats: Audacieux, Ouragan.

2nd Division.—Battle-ships: Hoche, flagship of Rear-Admiral Le Bourgeois, Amiral Baudin, Amiral Duperré.
1st class barbette-cruiser: Alger.
3rd class cruiser: Lalande.
Torpedo-gunboat: Lévrier.
Sea-going torpedo-boats: Téméraire and Coureur.

3rd Division.—Battle-ships: Dévastation, flagship of Rear-Admiral Gadaud, Neptune and Marceau.
2nd class cruiser: Davout.
3rd „ „ Troude and Cosmao.
Torpedo-cruiser: Wattignies.
Torpedo-gunboat: Bombe.
Sea-going torpedo-boats: Kabyle and Dragon.

Reserve Squadron :—

1st Division.—Battle-ships : Richelieu, flagship of Commander-in-Chief.
Battle-ships (coast-defence) : Caïman, Terrible.
1st class battery-cruiser : Tage.
3rd class cruiser : Forbin.
Torpedo-cruiser : Condor.
Sea-going torpedo-boats : Orage, Éclair.

2nd Division.—Battle-ship : Colbert, flagship of Rear-Admiral Prouhet.
Battle-ship (coast-defence) : Indomptable.
3rd class cruiser : Milan.
Torpedo-gunboats : Flèche, Dague, Dragonne.
Sea-going torpedo-boats : Aventurier, Agile.

To these must be added the armoured gunboats Fusée and Mitraille, and the fifteen torpedo-boats, forming the Défense Mobile of Toulon, under the command of Capitaine-de-frégate de Bonifay, which were placed under the orders of Vice-Admiral de Boissoudy, and the seventeen torpedo-boats of the Défense Mobile of Corsica and Algiers, which were attached to Vice-Admiral Vignes's squadron. The transport Gironde was also specially commissioned and manned by Reservists to act as a depôt ship for the Toulon torpedo-flotilla.

The position of the umpires.

The Active Squadron was under the Command of Vice-Admiral Vignes, and the Reserve Squadron under that of Vice-Admiral de Boissoudy. Neither of these officers, however, took any active part in that section of the manœuvres which will engage our principal attention, Vice-Admiral Vignes officiating as umpire-in-chief, and following the operations at sea in that capacity, while Vice-Admiral de Boissoudy was similarly employed in relation to a simultaneous series of operations which came within his special province. This position of the umpires afloat and in supreme authority may well be held to present many advantages over the system usually adopted in our own manœuvres. Umpires have not been sent to sea with the fleets in British manœuvres since 1889. As they were then embarked in combatant ships, and not invested with the authority of supreme command at the time, it may, perhaps, have been considered that they were not likely in these circumstances to maintain the required attitude of independence and impartiality. At any rate, it has been the later practice in British manœuvres for the umpires to remain on shore, and sitting as a Board, sometimes in London, sometimes at a naval port, to adjudicate on the questions submitted to them. This secures impartiality, sometimes at the expense of a complete grasp of the facts in dispute; but it involves delay, and entails many other inconveniences. The French system appears well adapted to avoid these inconveniences, and also to meet the objections formerly entertained to the now abandoned

practice of sending the umpires afloat in combatant ships. It has also the further advantage of probably teaching the umpires as much as they could learn from a more active participation in the operations.

First period. The first period of the manœuvres from July 1st to July 10th was devoted to preliminary exercises of various kinds, some of them manifestly suggested by previous manœuvres of our own, to which the French naval authorities appear to pay the high compliment of attentive study and close imitation. Among these were several torpedo-boat attacks, of which, according to Commander Garbett, only three were of any particular importance. "The first was made on the night of the 5th upon the Active Squadron, which was anchored in the Gulf of Juan, and the second during the following night on the Reserve Squadron, which was anchored off Villefranche. The object in each case was to show whether it was possible for a squadron, obliged to anchor in an open roadstead, to create round itself a fixed zone of light, thrown from the search-light, through which no torpedo-boat could pass without being discovered, and which would thus form an effectual protection. Each ship was directed to illumine a certain section of the anchorage, while the picket-boats were stationed to watch any dead angles. All the torpedo-boats were discovered as soon as they entered the limits of the zone, that is, at a distance of some 2000 yards. The last attack was made on the fleet at sea on the night of the 7th, the Commander-in-Chief wishing to ascertain whether the torpedo-boats would have much difficulty in discovering a large squadron in the darkness, and, on the other hand, whether the scouts of the fleet would succeed in discovering and intercepting their attack. The squadron stood out into the offing in the evening, leaving the light ships in shore on the look-out, either to stop the torpedo-boats or lead them astray. The torpedo-boats were grouped, two at Agay and five at Antibes; they weighed at 8 P.M., having received from the semaphores the exact position where the ships were last seen. At the time the fleet was only some 15 miles from the shore. After dark the ships proceeded without lights, the Admiral steering a zig-zag course, first towards and then away from the land, the ships being in two columns in line ahead, and thus covering a great deal of ground. The torpedo-boats from Agay were discovered by the cruisers and destroyed, but the others slipped through the cordon and safely gained the offing about 9.30 P.M.; they then spread like a fan, and soon succeeded in getting in touch of the squadron. They were discovered, and the ships opened fire, but, it is stated, very much at random, and recklessly with regard to the positions of each other, so that there is little doubt but that one or more would have been successfully torpedoed.

On the 10th the ships returned to Toulon to coal and prepare for the grand manœuvres which were to follow."

Remarks on the operations.

The first experiment is important, and has no exact precedent in English manœuvres. But the circumstances which would compel a sea-going squadron to anchor in an open roadstead off an enemy's coast known to be provided with a mobile defence of torpedo-boats must surely be very exceptional indeed. If the coast is not an enemy's coast, then the attacking torpedo-boats would in most cases have to traverse a long distance before reaching it, and might also be supposed to be not very precisely informed as to the particular roadstead selected. In such a case, though the fixed zone of light appears to afford an effective method of defence, it is perhaps by no means certain that it is the best method of defence. On a clear night such a zone of light would infallibly attract every torpedo-boat within a radius of something like 50 miles. In 1889 Admiral Baird's fleet, lying in Queenstown Harbour, used the search-light freely in defending itself against torpedo-boat attack. The glare thus produced was observed by the Rattlesnake, off the Fastnet, at a distance of some 50 miles.

Torpedo-boat attack on a fleet at sea.

The last case mentioned appears to show that, in spite of the close attention bestowed in the French Navy on torpedo-boat attack and defence, there is no very material difference between the results of French experience and those obtained in other navies. It is not very surprising that the torpedo-boats should have readily found the fleet in the circumstances described; and the fact that the fleet to be attacked allowed its position to be accurately observed towards nightfall from the shore, and remained throughout the operations at no great distance from the land, would seem to show that the torpedo-boat menace was rated by Admiral Vignes as by no means extravagantly formidable. It appears that when the ships opened fire they did so "very much at random, and recklessly with regard to the positions of each other." For a Navy, whose officers, as a foreign critic has lately pointed out in an English periodical, are intensely studious of the whole science and art of modern naval warfare, and vastly superior to our British naval officers in this particular respect, this is rather a surprising result. It points to the very serious danger—a danger often experienced in our own manœuvres—which is involved in the defence of a fleet at sea, disposed in certain formations, against the attack of torpedo-boats. But it is a danger so obvious that the French Navy, of all others, might be expected to have discovered and adopted the best means of averting it. Any formation which places the ships of a fleet broadside to broadside within range of each other's guns must expose the ships so disposed to a more or less

destructive fire from their own side in the event of hostile torpedo-boats getting in between them. Indeed, it might almost be a question whether torpedo-boats daringly handled might not, by drawing a fire from one column which must place the opposite column in serious jeopardy, compel a hostile fleet to inflict as much damage on itself as the torpedo-boats themselves could hope to inflict by the use of their characteristic weapon. In his general instructions for squadrons or groups of ships engaging each other, Admiral Vignes laid down a general rule that the formation of line ahead was to be adopted, although it might not "appear to be the best order of battle." The reason he gave was that "in other orders of battle, which commanders of squadrons have considered as more convenient, it is impossible to foresee with any certainty the conditions under which different ships may pass each other, or the confusion which may ensue. However interesting they may be as a matter of experiment, it is better to give them up in order to ensure the guarantee of safety which prudence enjoins should govern manœuvres in time of peace, and to avoid the risks of collision which, in time of war, would be the principal objective."

The line ahead, its advantages and disadvantages.

If space permitted, this very remarkable utterance might well invite detailed comment. It raises directly the very important question of the comparative value to a modern naval officer of sea training and experience on the one hand, and harbour-studies, or studies which do not necessarily involve sea-experience, on the other. "Nauticus," the critic above referred to, tells us that the scientific studies of the French naval officer are profound and sustained. Admiral Vignes says, in effect, that the French naval officer is not to have the opportunity of bringing his scientific and theoretical studies to a practical test in the only conditions which a state of peace affords. Admiral Vignes declined to allow his very scientific officers to adopt any other formation than line ahead for the line of battle. What would he have said if he had seen the evolutions of the Red and Blue Fleets, commanded by officers whose scientific training is represented as not to compare with that of the French, but whose sea-aptitudes happily appear to be not inferior, in the engagement of July 29, off the Calf of Man ? Here the two fleets, being disposed in columns of divisions line ahead, first passed each other on opposite courses. Then, to quote an eye-witness writing in the *Times*, "as soon as the Blue columns had passed, the Red columns were inverted, turning outwards sixteen points ; and then as the Red columns, having recovered their distance again, came abreast of the Blue, the Blue second division was temporarily stopped while the first division, altering course together eight points to port, made as if it would ram or break the line of the first

Red division." "It is certain," wrote the same correspondent in a subsequent letter, "that when the Blue first division charged down in line abreast on the first Red division steaming across its front, the assailants got rather out of hand, and came far nearer to their adversaries than the rules permitted, or than abstract considerations of safety would have sanctioned." It is true that evolutions of this kind involve a certain amount of risk, but not more perhaps than skill, nerve, and experience may fairly be trusted to eliminate. But to forbid them altogether on the score of risk, and to rely upon theoretical training to supply the aptitudes they engender, is surely a very questionable policy.

The dispositions of Admiral Vignes.

It is not quite easy to understand why, considering the view which Admiral Vignes seems to have held concerning the formation to be adopted for the order of battle, he should have adopted a different formation, that of columns of divisions line ahead, for the purpose of meeting an anticipated torpedo-boat attack. It is true that the particular formation adopted involved no risk of collision in the circumstances, but it was not specially adapted for dealing with torpedo-boat attack. Unlike the single column in line ahead, such a formation allows no change of course to be made without the use of signals, which are very apt, in spite of all precautions, to betray the position of the fleet; and if torpedo-boats find their way between the columns, it necessarily exposes each column to the stray fire of the other. The statement that there is little doubt that one or more of the ships would have been successfully torpedoed may be taken for what it is worth. It is generally assumed by the advocates of torpedo-boats that torpedo-boats will be able to do in actual warfare what they very often fail to do in manœuvres. This may or may not be the case, but the assumption must not be allowed to take the place of actual facts. The French appear to have adopted the English practice of fitting torpedoes employed in manœuvres with collapsible heads. This allows the torpedoes to be actually discharged, and the condition of the head, after the torpedo is picked up, will generally show whether it has been in contact with a ship or not. Even so the evidence is only presumptive, and needs to be collated with the evidence of the ship alleged to have been struck and of other ships within range of the attacking boat, because it is always possible that the attacking boat may have been put out of action before she discharged her torpedo. In default of such evidence, a mere statement, which may be *ex parte*, that there is little doubt that one or more ships would have been successfully torpedoed, is comparatively worthless.

The strategical manœuvres.

From the 17th to the 28th July it was intended that strategical

manœuvres should be carried out by the Active and Reserve Squadrons, with the addition of the vessels commissioned at Toulon for the purpose and the Défenses Mobiles of the 5th Arrondissement, Corsica and Algeria. As in the case of our own manœuvres, however, the period was subsequently abridged, the main theme having been exhausted in less time than was anticipated. The programme included three separate sets of operations, namely :

1. Manœuvres of double action.
2. Manœuvres of simple action.
3. Engagement at sea between the two squadrons.

Disregarding the foregoing order, it will be convenient to take the two latter first.

For the manœuvres of simple action we may again borrow from Commander Garbett's valuable and instructive *précis*. Manœuvres of simple action.

"The following was the theme indicated : 'A squadron of battle-ships is compelled, in order to make good some necessary repairs, to anchor in an open roadstead, where the ships are, however, protected by mines and the coast forts from being rammed at anchor, but are exposed to bombardment and attacks from the enemy's torpedo-boats. The object of the enemy, after reconnoitring the position of his opponent with his battle-ships, having no cruisers with him, will be to bombard and attack him with his torpedo-boats if an opportunity presents itself, but to withdraw in the evening, so as to avoid being attacked himself by the torpedo-boats of the other side. The duty of the commander of the anchored ships is to repel the hostile torpedo-boats, and at the same time to follow the movements of the enemy with his own, which are to attempt to keep touch with and attack the hostile ships during the night following their appearance on the coast.'

"The attack was first made by a division of four battle-ships of the Active Squadron, viz., the Courbet, Redoutable, Amiral Baudin, and Amiral Duperré, and the torpedo-boats of the squadron and Défense Mobile of Corsica, the whole under the command of Capitaine-de-vaisseau Chateauminois of the Courbet. This division in its turn selected an anchorage in Corsica, where the other squadron, consisting of the Caïman and the Gironde, which for the occasion was considered a battle-ship, and the armoured gunboats and torpedo-boats of the 5th Arrondissement, under the command of Capitaine-de-vaisseau Forêt of the Caïman, attempted the same operation. Vice-Admiral de Boissoudy, as already stated, acted as umpire for these operations."

The bombardment contemplated in this theme, being, of course, a mere make-believe, calls for no comment, and the only point of Their results.

interest is the part played by the torpedo-boats in this series of operations. It does not appear to have been a very brilliant one. There is no mention of torpedo-boat successes during the bombardment, and it is specifically stated by Commander Garbett that "in each attack the attacking force seems to have withdrawn successfully when night fell, the torpedo-boats of neither side succeeding in finding and attacking the enemy during the night." Thus the only feature of tactical interest in these operations was devoid of positive result. The torpedo-boats scored no successes at all. Here, it might be thought, was a capital opportunity for the torpedo-boats to employ those geometrical methods of search and chase which have been recommended with so much confidence by two chiefs of the "jeune école," Commandants Z—— and H. Montéchant, in their "Essai de Stratégie Navale." The value of these methods in certain circumstances is not to be gainsaid, and English naval officers might study them not unprofitably; but the fact that the torpedo-boats failed on two occasions to find a retreating fleet, whose position and initial course at nightfall was known to them, would seem to show, either that the geometrical method was not employed on these occasions, or that it is not more infallible than other approved methods of less geometrical precision. Nevertheless, Commandant Z——, writing in "La Marine de France," insists in glowing terms on the transcendent merits of the method he recommends. If it had been properly studied and pursued, he says, "les manœuvres du service des renseignements, de la recherche et de la poursuite de l'ennemi n'auraient plus de secrets pour nous; la marine française serait aujourd'hui, au double point de vue tactique et stratégique, la première marine du monde." In default of further and more decisive experience, it is hard to rate the method in question quite so highly as this. It is true that it was successfully employed, according to the same authority, in the attack of torpedo-boats upon the squadron of Admiral Vignes during the operations already described; but really to employ an elaborate geometrical method for the solution of what was apparently so very simple a problem is rather like using a sextant to measure a man for a suit of clothes.*

Third section of manœuvres.

The third section of manœuvres hardly lends itself to comment. The operations appear to have been closely copied from our own

* "Nauticus" seems to think that a British lieutenant, instead of keeping a tedious watch in harbour, might with advantage cede his place to an intelligent petty officer and retire to his cabin to read the "Essai de Stratégie Navale." French lieutenants are presumably relieved of the irksome but not altogether superfluous duty in question, and able to employ their time as suggested. Does it appear that they are much better able to put their theories into successful practice when the time comes?

tactical manœuvres of 1891; but tactical manœuvres can only be profitably studied in detail if all the facts are disclosed, and these were withheld by the French Naval authorities, probably from the same motives as those which induced the Admiralty to issue only a very meagre and severely expurgated report on our own tactical manœuvres of 1891.

Manœuvres of double action.

We now come to the so-called manœuvres of double action. Here we may again avail ourselves of Commander Garbett's narrative for a *précis* of the official documents, and of the initial dispositions of the squadrons engaged. The instructions issued by the Minister of Marine were in substance as follows:

Instructions issued by Minister of Marine.

"*Position of the Squadrons.*—Two hostile fleets, represented by the Active and Reserve Squadrons, knowing each other's strength and position, are ready to take the sea 48 hours after the declaration of war.

"The first (the Reserve Squadron) is stationed at the Hyères Islands. The anchorage which it occupies is supposed to be defended by submarine mines, which protect it from being rammed by the enemy's ships. These mine-fields block all the accessible channels to ships of large tonnage, from Jaune-Garde to Grand-Ribaud, from Gros-Seraignet to Titan, from Titan to Cape Bénat. Moreover the coast batteries are supposed to prevent any enemy approaching within 4000 yards. The Reserve Squadron has also at its disposal the armoured gunboats and torpedo-boat flotilla at Toulon, as well as the transport Gironde, and is supported by all the coast-defences between the 2nd degree E. and the Italian frontier, besides being able to use all the semaphores and signal stations of that part of the coast.

"The second fleet (the Active Squadron) is anchored in the roadstead of Ajaccio; it has at its disposal the torpedo-boats attached to Algiers and Corsica, and the support of the fixed defences of Corsica and of the African coast comprised between the meridians of 2° East and 8° 30′ East (from Bougie to Cape Bon), and also the use of the semaphores and signal stations of Corsica and Algeria, as well as the cable connecting Bone with Corsica.

"The rest of the Mediterranean littoral to be considered neutral territory, and the belligerent forces not to make use of any of the ports unless absolutely compelled by necessity.

"*The Rôle assigned to each Squadron.*—The duty assigned to the Reserve Squadron is to dispatch one of its divisions to sea, which will do its best to elude a division of the Active Squadron sent to intercept it, which division is superior both in force and in speed,

and then to attempt an attack on any point of the enemy's coast within the limits already mentioned. Moreover, it cannot go outside the zone comprised between the meridians mentioned above, in order to avoid the pursuit of the enemy.

"The *rôle* of the Active Squadron is to defend the coasts of Corsica and Algeria within the limits fixed. For this purpose it will watch the squadron of the Reserve at its anchorage, and will detach one of its divisions in pursuit of the enemy, in order to foil its attacks, and, if possible, as it is stronger, destroy it.

"*Time of the Manœuvres.*—War will be declared at noon on the 17th July. The two squadrons to have taken up their appointed stations by that date.

"For 48 hours, from mid-day on Monday, the 17th, to noon on Wednesday, 19th, the battle-ships of the two squadrons are to take the necessary measures for protecting themselves at their anchorage against the attack of torpedo-boats.

"The battle-ship of the Active Squadron, bearing the flag of the officer to whom has been entrusted the duty of taking charge of and directing the movements of the scouting vessels of the squadron, and the light vessels of both squadrons are at liberty to move at noon on the 17th.

"At noon on the 19th the battle-ships of the two squadrons are supposed to be ready to put to sea; but the division of the Active Squadron, to which the duty of chasing the enemy is assigned, is not to quit Ajaccio until the information has been signalled by the scouts that the enemy's ships have put to sea from the anchorage at the Hyères Islands.

"*Conclusion of the Operations.*—The operations will come to an end, should an action take place between the two divisions, or, in the event of their not meeting, at noon on the 28th.

"The division of the Reserve Squadron will only be considered as having been successful in any attack it may make on the coast, if it can maintain its position off any place for a space of six hours within bombarding distance: this distance is fixed at 8000 yards."

Prouhet's command.

To Rear-Admiral Prouhet, who had under his orders all the cruisers of the Reserve Squadron, and an ironclad division, composed of the Colbert (flag), Terrible, and Indomptable, was entrusted the task of making the raid against the Algerian or Corsican coasts.

Gadaud's command.

To Rear-Admiral Gadaud, in the Dévastation, was assigned the duty of observing the movements of the enemy at Hyères. He had under his orders all the cruisers of the Active Squadron, with which

to watch the three exits from that anchorage, and by means of a chain (extended over a distance of some 140 miles) to transmit the intelligence of the enemy's departure to the Corsican semaphores, and such other information as to his movements as would enable Rear-Admiral Le Bourgeois with his division, comprising the Hoche (flag), Neptune, and Marceau, on his leaving Ajaccio, to fall upon him before he could effect his object.

Speed allowed.

The ships of both combatants in these operations were allowed to steam, when circumstances required it, at $\frac{8}{10}$ of the maximum power which was developed at their trials.

Rules for engaging.

The rules for engaging and so forth were issued not by the Minister of Marine, but by Admiral Vignes, who, as we have seen, superintended the operations, taking no part on either side, but combining the function of umpire-in-chief with that of a neutral Commander-in-Chief. The most important of the rules, that enjoining the formation of line ahead for the order of battle, has already been quoted. The rest need not be given at length, as they do not materially differ from those in force in our own manœuvres. But the mode of assigning fighting values to the different ships, and of estimating these values during and after an engagement, had some peculiar features different from our own system, and perhaps entitled to the compliment of future imitation among ourselves. The following table gives the fighting values assigned and the maximum number of revolutions allowed to each ship :—

Active Squadron.			Reserve Squadron.		
—	Fighting Value.	Revolutions.	—	Fighting Value.	Revolutions.
Formidable	36	64	Richelieu	29	67
Courbet	35	68	Colbert	28	52
Redoutable	30	58	Caïman	25	72
Hoche	36	67	Indomptable	25	73
Neptune	36	71	Terrible	25	72
Amiral Duperré	34	60	Tage	21	74
Marceau	36	71	Forbin	8	104
Amiral Baudin	36	61	Milan	4	121
Dévastation	35	63	Condor	7	109
Cécile	21	83	Flèche }		
Alger	16	93	Dague }	2	263
Davout	13	106	Dragonne }		
Cosmao }					
Troude }	8	104			
Lalande }					
Faucon }	7	109			
Vautour }					
Wattignies	7	112			
Léger }	3	250			
Lévrier }					
Bombe	2	263			

To the torpedo-boats, as among ourselves, no fighting value was assigned.

General rules.

For the purpose of determining the result of an engagement the following rules were laid down :—

"1. In every engagement the superiority to belong to the ship or squadron possessing the greatest number of points as laid down in the table.

"2. Ships are always supposed to be in action when within 3000 yards of each other.

"3. The issue of an action will be regulated by the following rules :—

"*a.* Every single ship having an action with a superior adversary to be considered as destroyed or captured; but the ship or ships which are the victors are to be considered as having herself or themselves lost fighting value to the extent of one-third of the points represented by their opponent.

"In the case of several ships being concerned in such an action, this loss will be taken off the strongest ship. In subsequent engagements, the ship whose value has been so modified is to hoist a signal giving her actual fighting value at the time.

"*b.* When two groups of vessels are engaged, the weakest will be considered as destroyed if the sum of the points representing the respective forces of the two adversaries are in the relation of more than 3 to 2; if less than this proportion, the weaker side will lose its strongest, and the stronger its weakest ship. (In the case, however, of an action between the ironclad divisions commanded by Rear-Admirals Le Bourgeois and Prouhet respectively, such action, in view of the superiority assigned to the first-named, is to be considered decisive, and these divisions at its conclusion are to return to the anchorage off the Hyères Islands.)

"*c.* Every battle-ship, cruiser, or torpedo-cruiser which shall have been torpedoed four times from a distance of less than 400 m. without having perceived or fired upon her assailant, is to be considered as destroyed.

"4. In every engagement the result will only be considered as decisive, and the above rules as applicable, if the ships engage under the following conditions :—

"*a.* If a battle-ship or cruiser remain by day for 20 mins. within at least 3000 m. of its adversary, or passes broadside to broadside within less than 1000 m. By night, if the weaker ship has been under the search-light for the same time.

"*b.* If a battle-ship or cruiser keeps a torpedo-boat under its fire for 90 secs. at less than 2000 m. by day, or under the search-light for

1 min. at night. This time will be doubled in the case of torpedo-cruisers, and tripled for torpedo-avisos.

"*c.* If torpedo-boats discharge their torpedo at any ship within a distance of 400 m. without being perceived or having fire opened upon them.

"5. Every ship destroyed or captured is to immediately drop out of action, and proceed to the anchorage at Hyères Islands until the conclusion of the manœuvres.

"No torpedo-boat will be allowed to be considered as discharging a torpedo over the number it has in its tubes. When these have been fired it can take no further part in an attack until receiving a fresh supply, either from a battle-ship or torpedo-depôt."

Remarks thereupon.

Two points in these rules appear to deserve the consideration of the Admiralty. In the first place, there was no secrecy about them. The French Naval authorities do not appear to entertain the view which prevails at the Admiralty, that matters of common notoriety and of general public interest ought to be regarded as official secrets. The corresponding rules applicable to our own manœuvres were never officially published. On the contrary, a special order of the Admiralty forbade them to be made known to any one except the officers actually engaged in the operations. They were made known, nevertheless, the reason being that in practice it is quite impossible to keep them secret. That in theory it is expedient even to attempt to do so in such circumstances is a proposition repugnant to common sense. Whatever the strength of the abstract reasons which may be supposed to recommend a policy on the face of it so unintelligible, they are one and all disallowed by the simple fact that the thing cannot be done. In the second place, the rule which reduces the tactical value of ships or fleets which have been in action, even if the action has resulted on the whole to their advantage, appears to be one in accordance with common sense, and worthy in all respects of imitation.

Gadaud's instructions.

If space permitted, it would be expedient to give the instructions issued by Admiral Gadaud to the squadron under his immediate command. A copious summary of these will be found in the valuable paper of Commander Garbett, to which we must refer our readers.

Resulting operations and remarks thereon.

The operations which ensued from the dispositions adopted by Admiral Gadaud may be regarded as a very interesting series of experimental exercises in the methods of blockade, scouting, and pursuit applicable to the modern conditions of naval warfare; but from a purely strategical point of view they appear to many critics to be radically faulty. The function assigned to Admiral Prouhet

was that of making a maritime attack on an enemy's coast in the face of a hostile fleet overwhelmingly superior in force. The strategical principles here involved were so fully examined in the *Naval Annual* of last year that they need not be discussed again. It must suffice to recall the conclusion there established. "There is no such thing in naval warfare as the evasion of a superior fleet by an inferior for the purpose of territorial attack on a hostile coast. The 'fleet in being' forbids it. The 'fleet of equal or answerable strength' renders it impossible. Lissa shows it to be so hazardous that no capable commander would ever again attempt it. If such things are attempted in naval manœuvres, they are a mockery, a delusion and a snare." *

Nature of the problem.

Hence we are forced to conclude either that the French naval authorities decline to recognise the validity of a principle which is established by the unbroken teaching of naval history, or that they thought proper to set it aside and thereby to divest the operations contemplated of all strategic actuality for the purpose of studying a purely abstract problem in the methods of blockade and scouting. This problem was as follows: Prouhet was at Hyères in command of a raiding squadron composed of the Colbert, 28; Terrible, 25; Indomptable, 25; Tage, 21; Forbin, 8; Condor, 7; Milan, 4; Flèche, 2; Dague, 2; and Dragonne, 2—the numbers indicating the tactical or fighting values of the several ships, so that the total strength of his squadron is evaluated at a co-efficient of 124. At Hyères he was blockaded, or rather perhaps observed, by Gadaud's squadron, composed of the Dévastation and all the cruisers of the Active Squadron, making a total fighting co-efficient of 138, together with a considerable number of torpedo-boats, which, although no fighting value was assigned to them, were a considerable addition to the scouting capacity of the squadron. Prouhet, after making his exit from Hyères, was to endeavour to elude the enemy's observation, and having done so, to make an attack at his discretion either on the coasts of Corsica or on those of Algeria within the prescribed limits. At Ajaccio was a superior fleet under Le Bourgeois composed of the ironclads of the Active Squadron. This squadron was to remain at anchor until it received the news of Prouhet's departure, and then to put to sea for the purpose of defending the territory threatened, and of bringing Prouhet to an action as soon as possible, the rules providing that any action between Le Bourgeois and Prouhet must involve the decisive defeat of the latter.

* The same question is fully discussed in an article on "The Command of the Sea" in the *Quarterly Review* for October, 1893.

Criticism of Gadaud's dispositions.

Strictly speaking Prouhet was never blockaded by Gadaud, as it would appear that he might have been. The object aimed at apparently was to allow Prouhet to get to sea so as to ascertain whether it was possible for Gadaud to keep touch with him and to transmit the intelligence of his departure to Le Bourgeois in time to enable the latter to intercept him. All that Prouhet did to escape observation prior to his departure was to place his squadron in the roadstead at Hyères in such a position that it could not be seen from the offing. He appears to have made no very determined attempt to keep the observing squadron at a distance by means of his torpedo-boats, though the torpedo-boat menace may have had its influence in determining Gadaud's very remarkable dispositions. Gadaud's squadron was described by the official programme as superior in force and speed to Prouhet's, so that had it been concentrated in a position convenient for observation it might, it would seem, have been able to bring Prouhet to an action as soon as he left Hyères. Such an action could not have been decisive, in the first instance, since Gadaud's co-efficient was 138 and Prouhet's 124, and these figures do not satisfy the prescribed condition of a superiority of more than three to two. But the result of the action would have been that Prouhet would have lost his strongest ship, the Colbert, counting 28, and Gadaud his weakest, the Bombe, counting 2. The subsequent movements of the two squadrons would then have been determined by a rule which prescribed that after an engagement the opposing groups of vessels were to steam severally 30 miles in diametrically opposite directions, the weaker side choosing the course. This would have compelled Prouhet either to abandon his immediate objective or to reveal his design, and in either case would have placed Gadaud at no serious disadvantage. As the latter had several vessels in company to which no fighting value was attached, it may be presumed that as soon as Prouhet quitted his anchorage he would have sent one or more of these to Ajaccio to inform Le Bourgeois of the fact, and to acquaint him with his own intentions. If "torpilleurs de haute mer" cannot be relied upon for this purpose, it is hard to understand why they should be specially classified as sea-going. Having thus placed Le Bourgeois in possession of the salient facts of the situation, Gadaud might thenceforth have neglected Corsica altogether as sufficiently protected by Le Bourgeois' superior fleet and devoted himself exclusively to the pursuit of Prouhet. Prouhet's position at the end of his prescribed course of 30 miles would be precisely known. The two fleets would then be less than 60 miles apart, for Gadaud owing to his superior speed would have completed the prescribed

course in advance of his adversary. Here all the conditions appear to be favourable for a successful application of the geometrical methods of search recommended by the "Essai de Stratégie Navale"; and if those methods are as certain as their authors believe, Gadaud could hardly have failed by their aid to come up with Prouhet before he reached the coast of Algeria, while, if the latter made for Corsica, Le Bourgeois would be on the look out for him. It must be acknowledged that the actual constitution of the two divisions of the Active Squadron—all the cruisers being attached to Gadaud's division—was not particularly well adapted for operations of this nature. But it might, and in actual warfare it probably would have been. The constitution of Gadaud's squadron as a scouting squadron pure and simple to the neglect of its fighting value, would seem to show that strategical considerations, as such, held only a subordinate place in the plans of the Minister of Marine.

Their complete failure.

It is certain, at any rate, that the actual dispositions adopted by Gadaud, though they constituted the determining factor of the operations, were entirely unsuccessful in the issue. Spreading his forces out in a zone of observation, so as to cover all the issues from the roadstead of Hyères, he stationed himself in the centre, and established a line of communications, by means of small groups of cruisers disposed at convenient intervals, with the nearest signal station of Corsica and the squadron lying at Ajaccio. By this disposition it was intended, not only to furnish Le Bourgeois with the earliest possible information of Prouhet's exit and apparent destination, but, while keeping touch with Prouhet in sufficient force to neutralize his cruisers should they attempt to attack, to make the line of communication pivot on its Corsican extremity, so as to keep touch with Le Bourgeois at the same time. On paper the proposed disposition looks ingenious and attractive enough, but it was manifestly liable to many dislocations and disturbances in practice, and, as a matter of fact, it broke down altogether.

Gain and loss involved.

Prouhet left Hyères at 6 P.M. on 19th July, and, his exit not being disputed, he shaped a course south from Cape Sicié. By 6.30 Gadaud had received intelligence of his exit, and the line of communication was engaged in transmitting this intelligence to Le Bourgeois, who received it at Ajaccio at 10 P.M. Thus a squadron, whose fighting value was 138—superior, but not decisively superior to the squadron it was required to observe—was primarily employed in transmitting a message which took 3½ hours to deliver. The distance is not more than 120 miles, and Gadaud had in his division two cruisers, the Lalande and Cosmao, whose trial-speed is given as 20·5 knots. Steaming at $\frac{8}{10}$ths of this speed, the *maximum* speed

allowed by the rules, they would attain a speed of 16·4 knots, and at this rate they would cover 120 miles in less than 7½ hours. Thus the net gain of Gadaud's very elaborate method of transmission was less than four hours; the loss was the employment of a fleet counting 138 in fighting value to do the work which a single cruiser counting 8 could have done.* It does not appear that the gain of four hours was in any way vital to the success of the dispositions contemplated by Le Bourgeois, and since the latter was necessarily over 100 miles nearer to Prouhet's objective, whatever that might be, than Prouhet was himself, the advantage of time and distance, as well as that of speed, must have rested with him, in any case, at the outset.

The teaching of naval history.

It is perhaps worth while to recall the teaching of naval history on this point. In the Trafalgar campaign Nelson's object, like that of Gadaud and Le Bourgeois, was to watch the Toulon fleet and pursue it in the event of its putting to sea. His ships were rickety, and unable to keep the sea in all weathers. Hence he was frequently compelled to keep the main body of his fleet at a distance, relying upon his scanty force of frigates to give him timely intelligence of Villeneuve's departure. When Villeneuve first left Toulon on the morning of 17th January, Nelson, with eleven ships of the line, was at anchor in Maddalena Bay. By 2 P.M. the next day Nelson had received the intelligence, and his fleet was under weigh. On the second occasion of Villeneuve's departure from Toulon, Nelson was at anchor in the Gulf of Palmas, at the south-western extremity of Sardinia. Villeneuve left on 31st March, and was last seen by Nelson's scouts on the evening of that day 60 miles south of Toulon, steering south with a north-west wind. Nelson did not receive the intelligence until the morning of 4th April, being at the time at sea 20 miles west of the Gulf of Palmas. It is true that these dispositions were not entirely of Nelson's choosing, but were rather forced upon him by the deplorable condition of his ships. "I know of no way of watching the enemy," he wrote to St. Vincent, "but to be at sea;" and he would certainly have preferred, had it been possible, as Captain Mahan forcibly says, "to keep his rickety ships close up against Toulon as Cornwallis kept against Brest." But the facts certainly show that he did not consider the disposition he adopted incompatible with the observation and pursuit of Villeneuve. He could not tell whether Villeneuve's objective was the Levant or the Atlantic. Thus he had to watch the whole Mediter-

* In fact, the Dragonne, a "torpilleur de haute mer," to which no fighting value was assigned, carried a second message from Le Bourgeois to Gadaud, and reached Ajaccio at 2 A.M.

ranean, miserably provided with frigates as he was, and his task was therefore far more difficult and far more comprehensive than that undertaken by Gadaud and Le Bourgeois, who knew that Prouhet's objective must be either Corsica or a comparatively narrow strip of the Algerian coast, and who were already on the spot in the one case, and on the enemy's flank in the other. In such circumstances it seems certain that Nelson would have considered himself very well situated at Ajaccio, and would confidently have relied on his scouts to give him timely intelligence of the enemy's movements. At any rate it is impossible to suppose that he would have employed nearly half his force—a force numerically sufficient to hold its own against the enemy—for the mere purpose of obtaining the information he required. It is true that on both occasions Nelson failed to intercept Villeneuve or even to ascertain his real objective. But in this respect he was no worse off than Gadaud, who, notwithstanding his elaborate and somewhat fantastic dispositions, managed to lose touch with Prouhet during the first night of the operations.

Further development of the operations.

At first everything seemed to go well with Gadaud. Prouhet had unexpectedly given him the initial advantage by leaving his anchorage in broad daylight, and under the immediate observation of a portion of the blockading squadron. The "tête d'éclairage" was duly organised for pursuit, and for some time it stuck close to the heels of the retreating Prouhet. As night approached the enemy was in full view, still steering south with his cruisers led by the Tage on his port hand. Then, apparently, Prouhet betook himself to an artifice employed with signal effect by the late Sir George Tryon when a portion of his fleet broke the blockade at Bantry Bay in 1888. At 10 P.M. Prouhet's cruisers began to work their search-lights vigorously, and behind the veil of light thus interposed Prouhet's battle-ships altered their course unperceived. At 11 Gadaud began to suspect that he had been outwitted, for, seeing nothing of Prouhet's battle-ships, he directed the Léger to observe the enemy more closely. She reported at midnight that the cruisers only were in sight. Prouhet, in fact, had got clean away under cover of his cruisers' search-lights. On the return of the Léger from her unsuccessful search, Gadaud first altered course to south-east and afterwards to north-east. Towards dawn on July 20th several green lights—"fusées vertes," apparently not steaming lights therefore—were observed to the eastward, and these were taken to be a friendly signal to the effect that the enemy was making for Corsica. At daybreak only the enemy's cruisers were visible, but Gadaud still seems to have persuaded himself that his battle-ships were making for Cape Corse, the northern headland of Corsica, and despatched the Lévrier to

convey intelligence to that effect to some of his outlying groups of cruisers. At 6.40 Le Bourgeois's squadron was observed in the south-east, and at 8 the two squadrons were united, and shaped a course for Cape Corse, the enemy's cruisers being still in sight and bent, as appeared in the sequel, on leading off their pursuers on a wild-goose chase. It is not quite clear what happened to the famous pivoting line during these distracted operations; but it appears in the end to have been completely dislocated and thrown into confusion.

Dispositions of Le Bourgeois.

It had been arranged beforehand that Le Bourgeois should put to sea as soon as he received the intelligence of Prouhet's departure, and steer in the first instance for the position occupied in Gadaud's scouting line by the Faucon where he might expect to receive further intelligence of the enemy's movements and destination. He left, as we have seen, shortly after 10 o'clock,* and having received the false information—due, apparently, to the "fusées vertes"—that Prouhet was making for Cape Corse, he shaped his own course in that direction, effecting his junction with Gadaud by the way, but subsequently sending the latter to scout on a line of sixty miles on the parallel of the signal station at Cavallo. As Prouhet was nowhere near Cape Corse, and as Le Bourgeois's subsequent dispositions were wholly without result until Prouhet unexpectedly played into his hands, they need not be examined in detail. The end of it all was that Le Bourgeois and Gadaud, having completely lost touch with Prouhet and failed to recover it, once more found themselves on the morning of July 21 in the neighbourhood of Ajaccio, where, as chance would have it, Prouhet fell helplessly into their hands.

Prouhet's change of plan and its consequences.

In the meanwhile Prouhet having completely eluded the pursuit of Gadaud, had continued his southerly course during the night. At daybreak the Davout, accompanied by the Bombe and two torpedo-boats, sighted him, quite unexpectedly and according to some accounts entirely by accident. The Davout, which belonged to Gadaud's group B, should, it would seem, either have been in company with Gadaud's flag as forming part of the "tête d'éclairage," or occupying a station in the line of communication. That she found herself unexpectedly on the heels of Prouhet's division would seem to show that Gadaud's dispositions were by this time completely disorganised. However, she seized the opportunity thus afforded her with great promptitude and sagacity, sending off suc-

* It must surely be by some mistake that Commander Garbett represents him as waiting until after the receipt, at 2 A.M., of a second message from Gadaud brought by the Dragonne. Such a proceeding would have rendered the whole arrangement of the elaborate line of communication a purely futile and even ridiculous expedient.

cessively the Bombe and the two torpedo-boats to convey the intelligence to Ajaccio, and remaining herself to observe the movements of the enemy. Prouhet continued his course during the day, the Davout still keeping him in view. But at nightfall, fearing that the information sent back by the Davout would bring the pursuers on his track, he abandoned his plan of attacking the Algerian coast, and, altering course to the eastward, determined to attack Corsica instead. This was his undoing. The Davout retained touch with him throughout the night in spite of his alteration of course, and no sooner had he reached the Corsican coast in the neighbourhood of Propriano, which he was preparing to bombard, than Le Bourgeois came up with him in overwhelming force and compelled him to surrender.

Views of French critics.

It appears to be the opinion of the majority of the French critics that Prouhet had the game in his hands if he had not "lost his head," as one of them bluntly puts it, when he bore up for Corsica instead of keeping his course for Algeria. It is true that he was at the time so far in advance of his pursuers that he might have reached the Algerian coast in time to carry out the bombardment of one of its ports in accordance with the rules which in that case would have pronounced him to have been successful in his enterprise. But his failure to do this, brought about by his just apprehension of the tremendous menace of a superior force in his rear, and, for all he knew, at his heels, was perhaps a better illustration of sound strategical principle than his success could possibly have been. In point of fact, the task assigned to him was a strategical impossibility. Le Bourgeois and Gadaud had only to remain quietly at Ajaccio to be absolute masters of the strategical situation. Their superior force in direct communication with the signal stations of the island completely covered its coasts. They were sufficiently supplied with cruisers to make practically certain that Prouhet could not pass the line between Ajaccio and the western limit of the manœuvre field without their being speedily informed of his movements, and their superior speed would in that case have enabled them to reach the coasts of Algeria in time to frustrate his designs. It is true that a raiding squadron might occasionally succeed in eluding a superior naval force on the look out for it and obtain a sufficient start over its pursuers to enable it to bombard a more or less defenceless town on the enemy's coast for a few hours unmolested. But the real reason why such things are not likely to be attempted in actual warfare is not so much the difficulty of the operation as its futility. If the squadron supposed to be intent on a raid is strong enough to try conclusions with the opposing fleet, that is, and must always be, its real

objective. Until that is disposed of, its offensive capacity is hampered at every turn. When that is disposed of, its liberty of action is absolute. If, on the other hand, it is not strong enough to try conclusions with the opposing fleet it is certain, sooner or later, to be overtaken by the latter, and when overtaken to be destroyed. In the meanwhile such raids as it may attempt are of singularly small strategic moment. No fleet liable to be overtaken and attacked at any moment by a superior force is likely to waste much of its limited stores of ammunition over a bombardment which, though it may harass and annoy the enemy and provoke him to severe reprisals, can secure no commensurate strategical advantage. Hence it is reasonable to suppose that the scouting operations involved were in the view of the French naval authorities the dominant and determining feature of these "manœuvres of double action," and that the strategical aspects of the case were regarded as quite a secondary consideration. Even so, however, it is certain that the scouting operations proved a total failure, nor is it easy to deny that the means employed were out of all proportion to the end to be attained.

The concluding paragraphs of the "Rapport Arbitral" of Vice-Admiral Vignes are here appended in the original text. It will be seen that that officer regards the issue of the manœuvres as the result of a double series of accidents. The Davout originally reported that Prouhet was on his way to Algeria. This information ought to have reached Le Bourgeois, if the signal-stations had worked properly, in the night of July 20–21; and it seems to be implied that if Le Bourgeois had received this information betimes he would have started off at once in pursuit of Prouhet, thus leaving Corsica exposed to the attack of the latter, who, being 180 miles to the westward and steering south at 6 P.M., changed his course during the night and bore up for Propriano. It is difficult to gainsay the opinion formed on this point by an officer who, as Commander-in-Chief, was necessarily in possession of many facts not recorded in unofficial narratives of the operations; but it seems unlikely on the face of it that the whole of Le Bourgeois's division would have got clear away to the southward before Prouhet appeared on the scene, and it is, perhaps, no great compliment to Le Bourgeois to suppose that he would have acted so decisively on the more or less ambiguous information transmitted by the Davout as to carry his whole squadron to the southward at once without leaving one or two of his fastest cruisers in communication with the Corsican signal-stations to recall him in case the enemy should after all appear in that quarter. Moreover, had he applied the methods of the "Essai de Stratégie Navale," he would

Admiral Vignes' comments.

have steamed at once to the point where Prouhet was last reported as seen, and then applied the geometrical method of search. In the former of these operations he could hardly have failed to come across Prouhet on his way to Propriano. For the rest, Admiral Vignes' criticism of the scouting line is substantially in accord with what has been said above.

"Il ressort de l'examen des faits qui précèdent, faits deduits des rapports des commandants, que le hasard a été le principal pour ne pas dire l'unique facteur de la rencontre entre les divisions cuirassées de l'amiral Le Bourgeois et de l'amiral Prouhet.

"Dans l'appréciation du commandant en chef, arbitre des manœuvres, ce hasard a favorisé la division Le Bourgeois et a tourné contre la division Prouhet qui eût certainement échappé à l'ennemi et insulté impunément les côtes de la Corse, si les avis transmis par le Davout étaient parvenus à la division Le Bourgeois dans la nuit du 20 au 21, pendant laquelle cet officier général aurait pu les obtenir des postes à nouvelles qui, eux, avaient été prévenus vers onze heures du soir.

"Le plan très judicieux et bien combiné de l'amiral Prouhet, dont les intentions ont été bien comprises et très bien servies, surtout au début par ses croiseurs, eût néanmoins encore réussi, si le Davout ne se fut attaché à ses pas avec une persistance que rien n'a pu lasser.

"Il y a eu des fautes et des erreurs commises de part et d'autre, mais les plus graves sont imputables à la ligne d'éclairage qui avait mission de surveiller les mouvements de l'ennemi et de conserver son contact.

"Quelques uns des bâtiments légers qui la composaient ne se sont pas assez exactement conformés, dès les premières heures, aux instructions qui leur prescrivaient de prendre, en arrière de la Dévastation, les postes qui leur étaient assignés, en infléchissant leur route dans la direction de l'ennemi. Aussi, alors même que le signal intempestif fait par le Lévrier et qui a jeté la ligne d'éclairage toute entière hors de la bonne voie, n'eût pas été fait, cette ligne était mal disposée pour fournir à l'amiral Le Bourgeois des renseignements sur la direction à suivre pour joindre l'ennemi le plus rapidement possible, et si la division de cet officier général eut continué à suivre la direction qu'elle avait prise avant le signal du Lévrier, elle ne s'en fût pas moins trouvée très embarrassée à la jonction avec l'amiral Gadaud pour reprendre le contact de l'ennemi perdu en ce moment.

"Par ailleurs le champ a été laissé trop libre aux bâtiments légers de la division Prouhet qui ont fourni, au moins à deux reprises, à l'ennemi l'occasion de les punir de leur témérité. Ils auraient pu être notamment détruits dans la matinée du 20 et n'auraient pu

continuer à circuler librement plusieurs jours après que l'exercice avait pris fin.

"L'exercice n'en a pas moins eu cela de très bon, que même les fautes commises portent en elles de très utiles enseignements, et le commandant en chef n'a que le regret de n'avoir pu faire recommencer l'opération dans laquelle chacun instruit par une première expérience aurait montré, avec les mêmes qualités, le sens plus exact de la situation, sens qui a fait quelquefois défaut, surtout au début."

French Manœuvres in the Channel.

We now come to the French manœuvres in the Channel, the theme of which, translated by Commander Garbett from the account given in *La Marine de France,* was as follows :—

Programme of manœuvres as issued from Ministry of Marine.

The manœuvres in the Channel had for their object the study of the conditions under which an attacking squadron coming from the north could force the Straits of Calais. In effect, the operations were of a nature to determine :

1st. The numbers and types of ships necessary for the defending force, to enable it to be kept informed of all the movements of the enemy.

2nd. The best position for the squadron to occupy, from which the principal operations of the enemy can be most effectually checked.

"A French squadron is lying at Cherbourg, ready to put to sea as soon as the entry of an enemy's squadron into the Straits of Calais shall have been signalled.

"The surveillance of the Straits has been organized from the declaration of war. The French squadron having received at Cherbourg the telegram from its scouts, announcing that the enemy is in sight, is to weigh immediately, to find and bring him to action.

"In moving upon the enemy, the squadron is to keep in constant communication with the shore, so as to receive, with the least delay possible, news of any attack made by the enemy on any point of the coast of the 1st Arrondissement Maritime.

"The *rôle* assigned to the enemy's squadron is to attempt to pass the Straits without being discovered, and then to ravage the French coast of the Channel, while avoiding a decisive action.

"The English coast to be considered neutral.

"The defending force has the support of the coast batteries, the semaphores, and all the forces which the Vice-Admiral the Maritime Prefect has at his disposal.

"The declaration of war will take place at noon on the 20th July,

at which time the ships of the two squadrons are to be at the stations assigned to them.

"Hostilities will end on the 28th July at noon, and the manœuvres will comprise the execution of the theme arranged, under two different conditions—in one case, the enemy will force the Straits between 4 A.M. and 4 P.M.; in the other, between 10 P.M. and 2 A.M.

"The Commander of A Squadron can choose for himself whether his first attack should be made by day or night."

Premature conclusion of the operations.

Admiral Barrera chose the night for his first attack, and the second part of the operations here contemplated was abandoned, as at the close of the first part, which ended prematurely, owing to the complete success of the attacking squadron, the Surcouf, one of the two cruisers of the defending squadron, had completely broken down, and the other, the Éclaireur, was required for service in China.

Defensive dispositions.

To guard the coast of the First Maritime Arrondissement, which was assumed to be open to the enemy's attack, twenty torpedo-boats were employed, three belonging to the Défense Mobile of Dunkirk, six to that of Cherbourg, and four to that of Brest, together with seven others specially mobilized at Cherbourg; in addition there were also the "torpilleur de haute mer" Zouave and the armoured gunboat Flamme, both belonging to the Défense Mobile of Dunkirk. The length of coast to be defended was about 270 miles, considerably more than that of the east coast of Ireland, which was defended in the manœuvres of 1892 by twenty-one torpedo-boats—a number which was regarded by many critics as altogether inadequate and absurdly disproportionate to the number the French would be likely to employ in similar circumstances. The French naval authorities have now furnished a very effectual answer to this criticism.

Number and disposition of torpedo-boats employed.

The torpedo-boats employed were supposed to be divided into three flotillas, each composed of two divisions or groups of three or four boats apiece, the headquarters of these flotillas being Dunkirk, Havre, and Cherbourg; but when the operations began, the Dunkirk boats were patrolling at sea between Boulogne and Calais, the Havre flotilla had detached two boats to patrol between Havre and the mouth of the Somme, and one division of boats remained at Cherbourg attached to the defending squadron. Certain of the signal-stations were mobilized and placed on a war-footing, being open day and night, the stations not specially mobilized being open during daylight only. Coefficients of value were assigned to fortified harbours as follows:—Calais, 70; Boulogne, 80; Havre, 80; La Hogue, 70, and Cherbourg, 300. Cherbourg was thus rendered too strong for the hostile fleet to attempt to reduce it; but it was understood that a demonstration against one part or another of its

extended sea-front, bringing into action only a portion of its defensive works, would be held to involve the application of only a corresponding fraction of the whole coefficient.

The following is a table of the fleets engaged, with the fighting value of the several ships, the number of revolutions, and the maximum speed allowed :— Composition of the fleets.

COMPOSITION OF MANŒUVRE FLEET.

	Fighting value.	Maximum No. of revolutions.	Speed corresp.
Squadron A. Commanded by Rear-Admiral Barrera.			
Battle-ships—Victorieuse (flag)	30	62·5	9
" " coast defence—Furieux	70	68	10·6
Tonnerre	35	47	10·2
1st class barbette-cruiser—Isly	25	91	14
Torpedo-cruiser—Épervier	12	104	18·6
Sea-going torpedo-boats—Turco, Grenadier	0 {	255 296	17·6 19·6
Grondeur	0	420	19·2
Squadron B. Commanded by Vice-Admiral Lefèvre.			
Battle-ships—Suffren	45	51	9·8
" " coast defence—Requin	100	75	12·6
Fulminant	35	58	10
3rd-class barbette-cruisers—Surcouf	15	107	16·3
Éclaireur	10	79	10
Torpedo-gunboats—Lance, Salve	{ 6 6	251 248	14 14
Sea-going torpedo-boats—Défi	0	420	19
Véloce	0	246	16
Lancier	0	325	23

The preliminary orders issued by Rear-Admiral Barrera, in command of the attacking squadron, were as follows :— Barrera's orders.

"Squadron A will weigh from the mouth of the Thames on the evening of the 21st, at an hour which will be signalled. The torpedo-boats will be coaled and stored before starting. Steam will be ready, so as to allow of each ship making easily the maximum number of revolutions allowed.

"The intention of the Admiral is to attempt the passage of the Straits of Calais during the night of the 21st and 22nd, passing, towards midnight, a line drawn between Cape Grisnez and the South Foreland.

"The squadron will be in line ahead, the ships sufficiently close

to keep well in sight of the next ahead. The Isly, accompanied by the Grondeur, will lead the line. The Epervier will be in rear.

"The speed will be that of the Victorieuse, the revolutions of the engines being 62·5, or 45 of the Suffren.

"As the great object of the squadron is to pass without being seen, no lights are to be shown, and no signal to be made unless absolutely necessary. The lights are, however, to be kept in readiness, in case it is necessary to show them to avoid collision.

"The squadron will be before Boulogne at daylight. It will cruise before that town for a given number of hours, feigning a bombardment. During this operation the Isly will keep a careful look-out in the north, in case the enemy should appear from Dunkirk. The Épervier will perform the same duties towards the south.

"On leaving Boulogne, the squadron will stand out to sea, with the apparent intention of proceeding to Havre, but in reality to gain such an offing as will enable it to pass unperceived by the enemy's ships and semaphore stations. The Isly, Épervier, and the torpedo-boats will then close on each other, ready to drive off any light-ship of the enemy which may attempt to keep touch with the squadron.

"When this result has been obtained, the Epervier and torpedo-boats will rejoin the squadron, while the Isly will continue her course alone along the French coast, destroying the semaphores and signal stations, and insulting the open towns between Tréport and Havre. She will make an offensive demonstration against the last town, standing to sea before night, and steering such a course as will lead to the belief that the rendezvous with her own squadron is toward the east.

"In the meantime the rest of the squadron will steer so as to avoid all encounter during the night, and will appear before Cherbourg at daybreak on the 23rd. It will arrive before that place, following a line drawn between St. Katherine's Point (Isle of Wight) and the centre fort. It is in this direction, 10 miles from the breakwater, that the Isly should rejoin; in any case she is to do so before Cherbourg.

"If, on arriving before Cherbourg, the Admiral wishes to have reports of the vessels that may be lying behind the breakwater, he will detach in advance the torpedo-boats, which will approach prudently and attempt to penetrate the roads by the east pass, torpedo any vessels, and leave by the west channel. In this case the torpedo-boats will either receive their orders by word of mouth or by special signal."

Narrative of the operations.

In accordance with this programme, Barrera having anchored during the day eight miles to the north-east of the North Foreland,

weighed again at 8 P.M. on the 21st July, and passed between Cape Grisnez and the South Foreland at midnight. There was a fresh south-westerly wind and the night was dark but not foggy. His passage was effected in the order and under the conditions as to lights, signals, &c., prescribed in his programme, and was entirely unmolested by the enemy. There was an efficient patrol off Cherbourg, which was perhaps superfluous in the circumstances, and the Surcouf with one torpedo-boat was sent by Lefèvre to cruise between the Varne and the English coast, but she does not seem to have observed Barrera's movements until some time after he had passed the Straits. To the eastward of the Varne the duty of watching for Barrera's approach was assigned to the flotilla from Dunkirk, and it appears to have been very inefficiently discharged. Rounding the Varne at 2 A.M. on the 22nd, Barrera appeared off Boulogne at 3.30, having previously sent the Isly ahead to see that the coast was clear. Thus the first problem of the manœuvres, that of "attempting to pass the Straits without being discovered," was solved entirely in Barrera's favour. It remained to proceed to the solution of the second, that of "ravaging the French coast of the Channel, while avoiding a decisive action."

Failure of the defence, and bombardment of Boulogne.

The failure of the Défense Mobile to detect or impede Barrera's passage of the Straits would appear to be partly due to the provision in the official programme to the effect that the surveillance of the Straits was supposed to have been organised from the moment of the declaration of war. War was declared at noon on July 20, but at that time Barrera's squadron was supposed to be 150 miles to the northward, and steaming at 9 knots, the maximum speed allowed to its slowest ship, the Victorieuse, could not, therefore, reach the Straits until 4.40 A.M. on the 21st, when, unless Barrera elected to force the passage in the daytime, he would be compelled by the rules to wait until after 10 P.M. Hence the surveillance of the Straits from noon on July 20 to 10 P.M. on July 21, though doubtless useful as an exercise, was entirely futile as a defensive measure, and could not but have the effect of tiring out the officers and crews engaged just at the time when they needed all their faculties. This effect was not slow in declaring itself. The Défense Mobile was literally caught napping. As Barrera's squadron approached Boulogne at daybreak, a division of the defending torpedo-boats was seen under Cape Grisnez, steaming at full speed to avoid capture. But they reckoned without the Isly, whose appearance in advance of Barrera's main body they do not seem to have observed. Their commanders, worn out by the long surveillance of the previous 40 hours, had gone below for rest, and the boats being injudiciously handled by

the officers in charge, came under the fire of the Isly, which speedily put them out of action with the assistance of the Turco and the Épervier. The significance of this incident requires no comment.* Shortly after the capture of the torpedo-boats the Flamme was observed at anchor off Boulogne—a significant commentary on the vigilance and prudence of the defence. She fired a few guns and endeavoured to get under weigh and escape. But it was too late. The Furieux was ordered to chase, and in a few minutes the Flamme was put out of action with all her torpedo-boats. This advantage was, however, to some extent counterbalanced by the breakdown of the Grondeur, a "torpilleur de haute mer" attached to Barrera's squadron, and as her injuries proved to be serious, she was sent into Boulogne for repairs and took no further part in the operations.

The Surcouf chased by the Isly.

Barrerra now proceeded to bombard Boulogne, remaining off that port until 9 A.M. In the course of the proceedings the belated Surcouf was observed near Cape Grisnez, and the Isly was detached to chase her. The Surcouf escaped to sea, but her attached torpedo-boat managed to get between the Isly and the shore, as the latter was compelled to go out of her course in order to avoid the shoals in her immediate front, and disappeared to the southward, having shaken off the pursuit of the Épervier. On leaving Boulogne Barrera steered westward towards the English coast, the Isly at the time of his departure being nearly out of sight in the north, and still in chase of the Surcouf, and the Épervier being left behind to watch the coast; "et ce croiseur," says the historian of the manœuvres, in *La Marine de France*, forcibly and significantly enough, "doit enlever aux torpilleurs du littoral toute velléité de prendre le contact de la division d'attaque; aucun d'eux d'ailleurs ne dessine la moindre tentative dans ce sens."

Break-down of the Surcouf.

The chase of the Surcouf by the Isly secured the desired object of driving the former out of reach of the French signal stations; but it was otherwise unsuccessful, as, indeed, was only to be expected since the Surcouf was allowed by the rules a maximum speed of 16·3 knots, and the Isly only a maximum speed of 14 knots. But in a couple of hours the Surcouf, which had shaken off the Isly,

* It may, however, be instructive to compare the actual performance of the French torpedo-boats on this occasion with the powers which have been claimed for torpedo-boats in the abstract by a French critic of our own manœuvres. This writer considers that Admiral Fitzroy should have sent all his available torpedo-boats to attack Admiral Seymour's squadron on its exit from Lamlash on the first night of hostilities. "Il est de toute nécessité," he says, "que celle-ci ne puisse prendre le large, sans s'exposer à perdre la moitié de ses navires. Si la chose n'est pas encore reconnue facile avec les torpilleurs actuels, il est certain que d'ici à peu d'années le problème ne sera plus discutable." In the light of actual experience we may perhaps wait for a few years to elapse before discussing it.

again came in sight of Barrera's squadron, bearing north-west from the latter. Barrera had at the moment no cruisers in company capable of chasing her, and doubling Beachy Head she got away to the southward. She had barely made good her escape when her starboard engine became disabled owing to the breaking of a piston ring. With a view to mislead her and falsify the information she might be expected to convey to Lefèvre, Barrera, as soon as he gave up the chase, altered course to the eastward, and proceeded in that direction until she was out of sight. Two hours later he again altered course to the westward, keeping along the English coast, the Épervier having rejoined in the meanwhile.

Proceedings of Lefèvre.

By 4 A.M. on July 22, Lefèvre received through the signal stations the information that Barrera had passed the Straits. He immediately weighed and proceeded with his squadron along the coast in an easterly direction. Off Barfleur he received from the signal station the intelligence of Barrera's demonstration at Boulogne, and forming his squadron in line abreast, with torpedo-boats and "torpedo-avisos" acting as scouts to seaward in front, he proceeded in the direction of Dieppe, sending into Havre three torpedo-boats belonging to the Défense Mobile of Brest to reinforce the local defence of that place. At the same time the Lance was sent ahead to obtain further information from the signal station at Cape La Hève, which was fully mobilized and supposed to be open night and day. No information was obtained, however. The signal station had received no intelligence whatever of the enemy, and it was 8 P.M. when the Surcouf, again chased by the enemy, made her appearance and reported to Lefèvre that she had last seen Barrera's squadron off Beachy Head, and that it was then making for Dieppe. Completely disconcerted at receiving no intelligence from the land, Lefèvre passed the night cruising with his squadron in front of Havre—tied, in fact, to a mute and disorganised signal station.

Attack of torpdeo-boats on the Isly.

Barrera, meanwhile, had been steaming at his maximum speed to the westward along the English coast. The Isly, after abandoning her first chase of the Surcouf, had returned to the French coast, pretending to play havoc with the signal stations as she passed along to the westward, and to throw a few shells into Dieppe. Here she disposed of two more of the defending torpedo-boats by the very simple artifice of drawing them out in pursuit of her and then slackening speed until she had put them out of action. It speaks very little for the judgment of their commanders that they should have thought it a feasible operation to attack a cruiser like the Isly in the daytime, and not much for their intelligence that they should have allowed themselves to be outwitted by so very elementary a ruse.

Barrera at Cherbourg.

Barrera, who had clung to the English coast throughout the day, altered course towards evening to the south-west, and by 11 P.M. had sighted the lights of Barfleur and Cherbourg. He maintained a respectful distance during the night and was not molested in any way. But the night was not without incidents of some significance. At 2 A.M. two torpedo-boats, of the Défense Mobile of Cherbourg, entered the harbour and reported suspicious lights in the north-west —a sufficiently aimless proceeding which appears to have been their sole contribution to the interest of the situation. An hour later Barrera's squadron observed the Buffle, which was stationed five miles from the breakwater, busily engaged in exchanging signals with the shore—an occupation which does not seem to have been followed by any appreciable result. Shortly afterwards Barrera altered course to the eastward, intending to pass within extreme range of Cherbourg and throw a few shells into the place. At this moment the Isly came in sight, and the Turco was sent ahead to communicate with her; but not being recognised by the Furieux and the Épervier the Turco was fired on by these vessels. About the same time a friendly torpedo-boat was fired upon by the Buffle, in spite of the private signals displayed by the former. It must be acknowledged that the events of the night were not very much to the credit of either side, nor was the whole course of the operations, as so far developed, particularly calculated to inspire confidence in the strategical and tactical actuality of torpedo-boat operations.

Conclusion of the operations.

Barrera learnt from the Isly that Lefèvre was cruising off Havre, where he had been joined by the Surcouf and some torpedo-boats. Accordingly he shaped a course so as to avoid the enemy, and steering to the north-east as soon as he had made an offing from the land, he sighted the Isle of Wight early in the morning. Lefèvre, on the other hand, after remaining tied to the La Hève signal station throughout the night, at last made up his mind that he could get no information in that quarter, and returned towards Barfleur to try his luck there. The Lance was sent forward to communicate, and the Salve and Surcouf were ordered to scout ahead and at extreme signalling distance to seaward. From Barfleur Lefèvre learnt that Barrera, after his brief demonstration before Cherbourg, had retreated in a northerly direction, and shortly afterwards the Surcouf signalled that she could see the smoke of several vessels towards the north-east. Lefèvre accordingly altered course in that direction, but soon found that the limited speed of the Suffren and the Fulminant forbade a successful chase, and that the Surcouf, apparently endeavouring to keep touch with the enemy, was rapidly leaving him astern. At this

point the Éclaireur broke down and reported herself unable to steam more than 6½ knots. Lefèvre accordingly resolved to support the Surcouf with some of the more effective of his lighter vessels, and for a time practically abandoned the chase himself. Presently the Surcouf was observed by the Épervier, one of Barrera's scouts, and the Isly, being ordered to chase her, soon afterwards reported the presence of the whole of Lefèvre's squadron astern. This induced Barrera to set sail on his flagship, the Victorieuse, as her prescribed speed, which determined that of his squadron, was only 9 knots, whereas that of Lefèvre's squadron, determined by the Suffren, was 9·8 knots. The Isly, ordered to remain astern and observe the enemy, once more displayed her capacity by cutting off and harassing several of his scouts, and at 2 P.M. Barrera's squadron rounded Beachy Head, being six miles in advance of his pursuers. Here the Surcouf's remaining engine broke down, reducing her available speed to 7 knots, and Lefèvre, finally abandoning the chase as hopeless, sent a flag of truce to the Isly announcing the conclusion of hostilities. Barrera thereupon proceeded to Dunkirk, and Lefèvre returned to Cherbourg, completely discomfited and never having once brought the main body of his squadron within sight of the enemy.

General remarks.

There is very little to be said about these operations beyond what has already been said in the course of describing them. They have been described in some detail, as that seemed the method best adapted for bringing out their salient characteristics. They certainly present the torpedo-boat in a very unfavourable light—a light less favourable, indeed, than the most severe critics of torpedo-boats among ourselves would probably have been disposed *à priori* to place it in. English critics have accustomed themselves to believe that there is no part of the Channel which can be regarded as beyond the strategical radius of skilfully-handled torpedo-boats having their base on either shore. Yet throughout these operations the French torpedo-boats were either conspicuous for their absence, or when present, were remarkable for their timorous inefficiency. They totally failed to prevent Barrera passing the Straits at a time when his advance must have been anticipated, and might have been calculated almost to a nicety; and if torpedo-boats cannot be relied upon even to molest and harass the passage of a sea-going squadron through a channel barely 20 miles wide, and within definite and comparatively narrow limits of time, it is very difficult to believe that they are really capable of doing anything effective at all. At any rate, they did nothing effective during these operations; their mere appearance on the scene was generally the signal for their precipitate retreat, and often for their immediate discomfiture, and the solitary occasion

on which they ventured to act on the offensive was one on which they literally attempted the impossible, and were promptly punished for their pains. For the rest, the only remark that suggests itself is that the French system of Défense Mobile must either be very imperfectly organised, or have been very ineffectively handled on this occasion, and, in particular, that the signal stations associated with it were manifestly quite unequal to the duties required of them. In spite of this, however, and in spite of the complete success of Barrera's operations, and of the complete failure of Lefèvre's counter-dispositions, there appears to be nothing in the proceedings to encourage the belief of the "jeune école" in the efficacy of a "guerre des côtes."

Torpedo experiments and their results.

It only remains to add that in lieu of the second series of operations—abandoned for the reasons already given—a series of experiments with torpedoes and torpedo-boats was carried out at Cherbourg and Brest. The experiments with torpedoes were significant, but by no means encouraging. Of seven discharges, six were more or less failures, and one only fairly good—if indeed it deserves that epithet, when the torpedo ran so near the surface that, even if it had exploded at all, the greater part of its effect would have been wasted. The torpedo-boat experiment was not much more encouraging. The Tonnerre was sent to sea towards evening, accompanied by the Lance as a torpedo-boat-catcher. Three torpedo-boats were sent out later to endeavour to find the ironclad, and torpedo her during the night. One broke down badly, and had to return to port, a second went astray altogether, the third found the Tonnerre, but was promptly driven off by the Lance. At Brest, however, the torpedo-boats were adjudged to have been somewhat more successful. What they accomplished is not quite clear, but we learn from Commander Garbett's narrative that "the operations are said to have taught some useful lessons as to the management of the search-lights." That is likely enough, and quite in accordance with analogous experience in our own manœuvres of many years past; but some irreverent critics will ask, nevertheless, whether, after all, the game is worth the candle.

II. Italy.

The Italian manœuvres and the "jeune école."

A writer in *La Marine de France*, the recognised organ of the "jeune école française," has called attention to the fact that the Italian manœuvres of 1893 were avowedly based on the views propounded in 'Les Guerres Navales de Demain,' a work published in 1892 by

two distinguished leaders of that school, Commandants Z. and H. Montéchant, whose "Essai de Stratégie Navale" has already been mentioned in these pages. Assuming that the naval war of the future will be mainly a war of coasts, the writers in question seem to think that the problems it presents will be comparatively simple of solution. Both propositions are open to considerable dispute. Neither can be accepted without large reservations and limitations. An Italian critic of the manœuvres in *L'Italia Militare e Marina* accepts the first and disputes the second. He is, perhaps, too much absorbed in the naval situation of his own country. It is probable enough that a war between Italy and any other naval Power in the Mediterranean would be, if not essentially a war of coasts, at least capable of being represented as mainly a war of coasts. But this results rather from the geographical situation and relations of the Powers supposed to be in conflict on the sea than from any recent development of the principles of naval strategy or from any recent changes in the methods and appliances of naval warfare. The maritime war between Athens and Sparta was, in a sense, a war of coasts. The maritime war between Rome and Carthage was, in a similar sense, a war of coasts. This, however, was in both cases an accident of the geographical situation, not an essential feature of the strategy involved. All naval warfare involves territorial enterprise, or, at any rate, freedom to undertake territorial enterprise without maritime impediment as its ulterior end. No Power seeks to command the sea except for the purpose of traversing it in security; and there is no principle more firmly established by the whole course of naval history than this—that in time of war the sea cannot be traversed in security either for military or for commercial purposes unless the Power which seeks to traverse it has established a strategical command over it. Thus, as a recent writer, already quoted, has said, "Command of the sea, in the sense of strategic freedom of maritime transit, is now, as ever, the final cause of all naval warfare. With it all things are possible which naval warfare can attain. Without it nothing is attainable." *

Command of the sea and its relation to a "guerre des côtes."

If these views are sound it follows that although a naval war between Italy and another Mediterranean Power is capable of being represented as a war of coasts—because the Mediterranean, so to speak, is all coast, and neither Power would be likely, at the outset, to attack the extra-Mediterranean possessions of the other—yet it would really be a struggle for the command of the sea affected by the operations. As such, its operations would be governed by those broad

* *Quarterly Review*, Oct. 1893.

principles of naval strategy which are essentially immutable, being inherent in the nature of things, and not by any narrower considerations specially founded on the incidents and conditions of a so-called war of coasts. All naval warfare is, in a certain sense, a war of coasts; and whether the coasts to be reciprocally assailed and defended are separated by a few miles or by half the circumference of the globe, the command of the sea between them is essential to the successful attack of either, though not to their successful defence. In other words, any Power which seeks to assail another across the sea, but not on the sea, must first secure the command of the sea which separates its own shores from those of its enemy as a condition precedent to such military enterprise as it contemplates. The ulterior success of the enterprise then becomes a military and not a naval problem, and depends, as such, not on the naval strength of the Power assailed, which, *ex hypothesi,* will have disappeared or been rendered strategically of no account, but on the relative military strength and capacity of the two combatants. Thus, from one point of view, we may call naval warfare a war of coasts; from another, a struggle for the command of the sea; but to call it a war of coasts is merely to describe it by one of its geographical accidents. To call it a struggle for the command of the sea is to define its essential nature.

The naval relations of Italy and France.

It is surely a strange mistake for any countrymen of Persano to regard their naval manœuvres from the point of view of a so-called war of coasts. The disastrous experience of Lissa must have taught them that a war of coasts undertaken in defiance of the historic principles of naval strategy is certain to end in disaster. On the other hand, it is doubtless a sound instinct which leads them to study the naval problems which would arise in the event of a war between Italy and France. This they appear to do without the slightest disguise. Of course, England and France do exactly the same thing, and though some disguise is occasionally attempted, it never deceives any one. Each pays the other the compliment of thinking it the only Power capable of contending against itself at sea, and each makes its dispositions accordingly. In like manner, Italy must regard France as its only formidable naval rival in the Mediterranean, and must consider how the undoubted superiority of France at sea might best be dealt with by the Italian navy in the event of war. This, with all respect for the "jeune école" and its partisans, is the real naval problem which Italy has to study, and not the untested strategy of a new-fangled "guerre des côtes."

The plain truth is, however, that, whatever the critics of the "jeune école" may think and say, the Italian naval authorities in drawing

up the scheme of the manœuvres of 1893 based it upon the old-fashioned and time-honoured principles of naval strategy as established by history and experience, and not upon any principles peculiar to the "jeune école." This will be seen at once from the following summary of the plan of operations which is taken from Commander Garbett's narrative:—

Real nature of the Italian manœuvres and official plan of the operations.

"The attacking squadron (supposed to be French), under the command of H.R.H. the Duke of Genoa.

1st Division—

Battle-ships: Lepanto (flag), Ruggiero di Lauria.
Torpedo-cruisers: Euridice and Monzambano.
Sea-going torpedo-boats: 103, 111, 114, and 131.

2nd Division (Rear-Admiral Corsi)—

Battle-ships: Italia (flag), Andréa Doria.
Torpedo-cruiser: Iride.
Sea-going torpedo-boats: 123, 124, 125, and 126.

3rd Division (Rear-Admiral Gonzales)—

Battle-ships: Dandolo (flag), Affondatore.
Torpedo-cruiser: Goito.
Sea-going torpedo-boats: 57, 62, 115, and 155.

"The torpedo-gunboats Aquila, Sparviero, and the Tevere, cistern-ship, were also attached to this squadron.

"The defending force, under the command of Vice-Admiral Accini:—

1st Division—

Battle-ships: Re Umberto (flag), Duilio.
Torpedo-cruiser: Minerva.
Sea-going torpedo-boats: 59, 65, 72, and 94.

2nd Division: (Rear-Admiral Puliga)—

Battle-ship: Castelfidardo (flag).
Protected cruiser: Stromboli.
Torpedo-cruiser: Urania.
Sea-going torpedo-boats: 71, 73, 74, and 137.

3rd Division (Rear-Admiral Marra)—

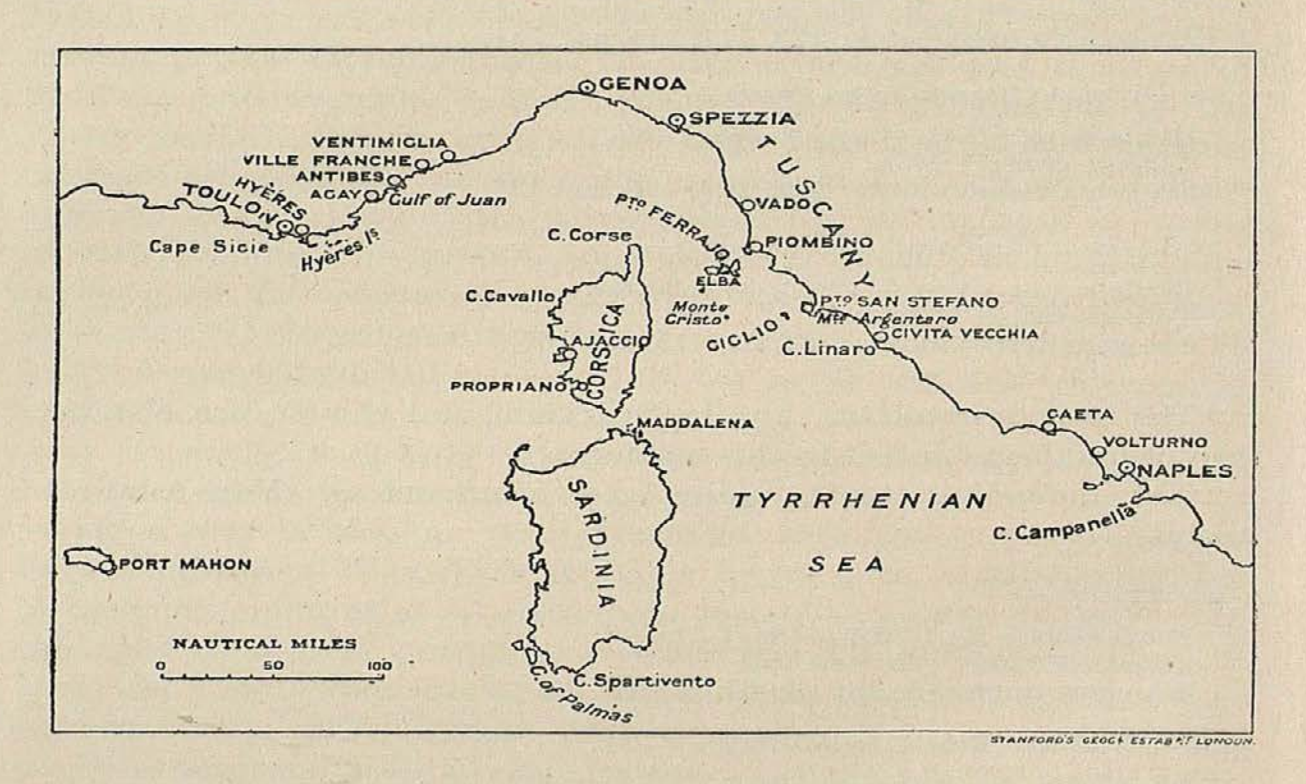
Protected cruisers: Fieramosca, Vesuvio.
Torpedo-cruiser: Aretusa.
Sea-going torpedo-boats: 76, 77, 91, and 139.

"The torpedo-gunboats Falco, Avoltoio, and the cistern-ship Pagano, were also attached to this squadron. In addition, 24 first-class torpedo-boats were commissioned, to assist in the defence of the various ports. Vice-Admiral Bertelli, who had supreme direction of the operations, hoisted his flag on the transport Trinacria, which

was neutralized; while Admiral Amezaga, who acted as Umpire-in-Chief, was also on board that ship.

"King Humbert, with Prince Henry of Prussia, was present during the second part of the manœuvres, on board the Royal yacht Savoia, as was also Admiral Racchia, the Minister of Marine.

"The limits of the manœuvre field were fixed by the coast from Ventimiglia to Campanella, in the south of the Gulf of Naples, then by a line drawn from Campanella to the Trapani Islands, from the Trapani Islands passing twenty miles south of Sardinia; the fourth line was made by the meridian of Ventimiglia. The limits comprised all Sardinia: the north-east coast, including Maddalena, was con-



sidered Italian soil; the ports on the west coast served as the base of operations for the attacking squadron under the Duke of Genoa.

"The attacking force had the superiority over that of the defence, both in battle-ships and armament, but the defending ships had the advantage in point of speed. The co-efficient of power of each squadron was 56 for the attacking force and 45 for the defending.

"The programme of the manœuvres was divided into three phases.

"In the first, from the 5th to the 15th August, the attacking squadron had as its object to attempt to force the defending fleet to

a decisive action, in order to gain the command of the Tyrrhenian Sea; while the latter, avoiding a battle, was, at the same time, to prevent the enemy from ravaging the coast. Genoa, Spezzia, and Maddalena were considered so strong that the enemy could make no effective attack against them.

"In the second phase of the manœuvres, lasting from the 16th to the 26th August, the offensive squadron had to attack the defending force, which was anchored in an open harbour for the purpose of making good repairs. The defending ships on their side were to attempt to escape, and, putting to sea, to re-form, and then take refuge in a better defended port, from whence they could continue to harass the enemy.

"In the third phase, between the 27th August and the 6th September, the hostile squadron had to escort a large convoy of troops, which were destined to be disembarked on the coast of Italy. The convoy at sea was to form a large square, the war-ships forming the angles. The speed was necessarily less than the usual speed of the squadron. The object of the defending force was to find and attack the squadron at sea, so as to prevent the disembarkation from being effected."

Narrative of the operations.

The attacking squadron was conveniently designated A, and the defending squadron D. A was at Vado when the first phase of the operations began on August 9, and D distributed between Porto San Stefano and Porto Ferrajo. Accini's first move was to send out all his cruisers to scout for the enemy, keeping only his battle-ships and torpedo-boats in port. The Duke of Genoa also sent out his cruisers, some to scout and some to sever the telegraphic communication between Sardinia and Italy, and destroy a railway bridge on the coast of Tuscany, proceeding with his main body along the north coast of Italy to carry out coast-wise operations against railways, telegraphs, signal stations, and the like, but taking care to give Genoa a wide berth. While he was thus engaged with two divisions—the third being employed in scouting and covering his seaward flank—the Aquila reported, on the morning of the 10th, that the enemy had been sighted to the eastward with a squadron of eight ships, and this was presently confirmed by the Monzambano, which had been despatched on an independent raiding expedition. The Duke of Genoa thereupon at once abandoned the operations on which he was engaged, and, forming his fleet in order of battle, proceeded to the southward in pursuit of the enemy. This was exactly what Accini wanted—to draw his adversary away from the shore, and, if possible, to entangle him in the narrow waters between the Tuscan islands and the coast where torpedo-boats could operate to best advantage. The

Duke, however, was not to be led into the trap. He kept in the open during the night, shaking off the enemy's observation, and on the morning of the 11th appeared off Civita Vecchia, which he proceeded to bombard. Accini, on the other hand, having lost touch of his adversary, remained for the night at Giglio, where he re-assembled his forces. In the morning he sent his third division out to scout, and, steaming towards the land himself, received at 10 A.M., from the signal station at Monte Argentaro, the information that the enemy had been sighted steaming towards the Roman coast. He accordingly shaped a course for Civita Vecchia, with the object of interrupting the bombardment. In this he was successful. As soon as the Duke of Genoa perceived his approach, he suspended his fire at the town, and formed his fleet for the purpose of attacking Accini. The latter, being inferior in strength, could fight no action, but he had carried out his immediate purpose of drawing off his adversary, and having done so, he steamed away again at full speed, the Duke following in pursuit. Here the Castelfidardo, Accini's slowest ship, appears to have had a narrow escape. She could not keep up with the retreating fleet, and was threatened by the Duke's torpedo-boats. But Accini ordered his own torpedo-boats to engage and drive off the assailants, and in this they were adjudged to have been successful. Accini, having a general superiority of speed, made good his escape, and was at least partially and temporarily successful in frustrating the bombardment of Civita Vecchia, which, however, the Duke subsequently resumed by detaching the Affondatore and the Dandolo for the purpose as soon as Accini was seen to be in full retreat. At this point an armistice was declared, the Duke returning to one of his ports in Sardinia, and Accini proceeding to Naples, as if to repair damages and take in stores, while the cruisers and torpedo-boats of each side were permitted to observe the movements of the other.

Remarks thereupon.

It will scarcely be denied that in this series of operations the "guerre des côtes" had shown itself to very little advantage. Accini, though unable to try direct conclusions with his adversary, had twice shown his capacity to control that adversary's movements. It is difficult to determine the precise strategical value of demonstrations from the sea against railways, telegraphs, signal stations, and the like; but it is safe to say that the conditions in which they can attain to decisive importance must be more or less exceptional, and that the value of maritime attack on land fortifications, properly constructed and vigorously defended, is very apt to be overrated. There is no war without casualties—no making of omelettes without breaking of eggs; but the fact remains that both the Duke of

Genoa's undertakings were interrupted, if not frustrated, by an inferior defending force, and that the close of the operations left the strategical situation very much as it was at the outset.

Narrative continued.

Two days later, on 13th August, Accini recalled his scouts, and concentrated his force for the defence of Gaeta and Naples. The next evening the enemy was reported in the offing, and Accini found himself caught in a trap. It was too late for him to weigh anchor and escape, and early in the morning the Duke of Genoa, entering the Bay of Naples with his whole force, compelled Accini's surrender in accordance with the rules. The accounts at this point are so vague that it is not easy to understand how this result was brought about. If the armistice, established on the evening of the 11th, was formally concluded before the Duke of Genoa put to sea again, it is natural to suppose that Accini would be equally free to put to sea at the same time. It is still more strange that, having neglected to do so, he should have failed to surround his anchorage with cruisers and look-outs, which might have warned him of the enemy's approach in time to enable him to make his escape. It is odd again that, being apprised of the proximity of the enemy in the evening, he should have made no use of his torpedo-boats, thirty-four in number against only fourteen of the enemy, during a night which is stated to have been very dark and somewhat foggy. When the morning came, these torpedo-boats were employed—in somewhat bizarre fashion, according to English ideas—to impede the advance of the attacking fleet, Accini weighing at the same time with his battle-ships and endeavouring to get away. But the Duke of Genoa was now too close upon him, and his hitherto successful and well-inspired strategy was brought to an ignominious conclusion. This incident, as described, appears to afford very little strategical instruction. Without knowing the precise causes of Accini's unaccountable failure to detect the enemy's approach in time to secure his own line of retreat, it is impossible to determine how far they were such as are likely to operate with similar disastrous effect in actual warfare. As matters stand, the proceedings wear an air of unreality, and suggest the suspicion that, for reasons possibly rather political than strategical, the result was in some way pre-ordained.

Second phase of the manœuvres.

In the second phase of the manœuvres Accini's squadron D was anchored as if for repair at Gaeta, a more or less unfortified anchorage supposed to be accessible to a powerful attacking squadron. Measures were taken to improvise shore defences, and were doubtless valuable as exercises, but as these do not seem materially to have effected the naval result they need not be closely examined. The anchorage was closed by an immense boom, in which only two passages were left,

a northern and a southern, each of which was covered by a shore battery, and illuminated on the night of the operations by a powerful beam from a search-light. The anchorage was sown with mines; torpedo-boats and other light craft patrolled the neighbourhood of the boom; and the Aretusa and Minerva were told off to scout in the offing and to watch for the enemy, who was expected to come from the direction of Naples—the night on which the attack was to be made, that of August 22, having been determined and made known beforehand. At 9 P.M. Accini ordered his squadron to prepare for sea, and at the same time the approach of the enemy was signalled. An hour later an action was in full progress. The defending cruisers were driven back within the boom, but the torpedo-boats remained outside to oppose the enemy's advance. How far they were successful must be purely a matter of conjecture, since the accounts seem to imply that no torpedoes were discharged, and unless this is done and the results are sifted and recorded, the operations of torpedo-boats in manœuvres must always be totally devoid of actuality. A portion of his squadron was detached by the Duke of Genoa to attempt to destroy the boom, while he steamed with the remainder direct for the southern entrance. This led, in the one case, to a furious cannonade from the shore, and in both, to a sustained onslaught of the defending torpedo-boats, which was held to have checked the enemy's attempt to force the passage. At this moment all the search-lights of the defence were suddenly and simultaneously extinguished, and while the engagement was still hotly carried on in the neighbourhood of the south passage, the Re Umberto and the Stromboli slipped out through the north passage unperceived and got away to seaward. Shortly afterwards Accini ordered the Duilio, the Fieramosca, and the Castelfidardo to slip their cables and proceed to sea through the southern passage, which by this time was clear, the enemy having been forced back by the defending torpedo-boats. This squadron also got clean away without being molested or detected, and subsequently rejoined its consorts at a preconcerted rendezvous.

Remarks thereupon.

Thus the second game of the rubber was scored by the D squadron, but the accounts are too meagre for a detailed estimate of the relative skill of the players. There would seem to be many elements of unreality in the operations as described. What is certain is that Accini got away unperceived with the main body of his squadron, and as this was his primary object, his success was so far incontestable. But the operations of the Duke of Genoa are not entirely intelligible. The port in which Accini had taken refuge was supposed to be one not capable of sheltering him against the attack of his adversary; but, this being so, there seems to be no reason why

the Duke should have allowed himself to be forced back at the critical moment, thus leaving the way open for Accini's escape—unless, indeed, we assume that the official conventions required him to give way before the onslaught of a given number of torpedo-boats. But in that case the plan of operations would seem to be not very judiciously nor even very fairly framed. If the result was to be determined by the mere presence of a given number of torpedo-boats in a position favourable for attack, then the issue was practically decided in Accini's favour at the outset by giving him the required number of torpedo-boats. If, on the other hand, the result was to be determined by the actual performances of the torpedo-boats, we can form no judgment on the matter without knowing exactly and in detail what those performances were. In any case, it is remarkable, perhaps, that no attempt was made by the Duke of Genoa to destroy the boom, and, having destroyed it, to steam straight for Accini's ships inside, leaving all questions between himself and the enemy's guns and torpedo-boats to be decided afterwards by the umpires. A boom must be very strong indeed if it is to stop or damage a battle-ship steaming against it at full speed. During the operations at Berehaven in 1885 the Polyphemus went through a double boom formed of the spars of the heavily-rigged ships of the squadron—strengthened by a 5-in. steel hawser rove along each boom—as if it were packthread, and without the slightest shock being perceptible on board. Many considerations may have prevented a repetition of this performance by any of the ships of the Duke of Genoa's squadron; but there can be little doubt that such things will be frequently attempted in actual warfare and will be not unfrequently successful.

Third phase of the manœuvres.

Reconstitution of the squadrons.

For the third phase of the operations the two squadrons were differently constituted. Squadron D, under Accini's command, was now reduced to one battle-ship, the Re Umberto; three cruisers, the Stromboli, Aretusa, and Minerva; two "torpedo-avisos," the Nibbio and Avvoltoio, and twenty-two torpedo-boats; and was stationed at Spezzia. Squadron A, under the Duke of Genoa, consisted of eight battle-ships, the Italia, Lauria, Dandolo, Duilio, Doria, Lepanto, Castelfidardo, and Affondatore; six cruisers, the Vesuvio, Fieramosca, Monzambano, Euridice, Iride, and Urania; the "torpedo-avisos" Aquila and Sparviero, twenty-six torpedo-boats, and four vessels (without fighting value) to mark the four angles of the area supposed to be occupied by the transports. The head-quarters of Squadron A were at Maddalena. The Duke's first move was to send out the Euridice, Iride, Urania, Aquila, and Sparviero, together with four torpedo-boats, at full speed to explore, on the one hand, the neighbour-

hood of Elba and the Piombino Channel between Elba and the mainland, and, on the other, the roadstead of Gaeta and the Bay of Naples. The remainder of the squadron was distributed into four divisions, one of which, the Lepanto, with a contingent of torpedo-boats, remained at the disposition of the Commander-in-Chief; while the remainder, consisting of (1) the Italia and Lauria, (2) the Dandolo and Duilio, and (3) the Doria and Fieramosca, each with a contingent of torpedo-boats, were despatched in the first instance to convoy the several contingents of transports from the different parts of the coast where the troops of the invading army were supposed to embark. The Castelfidardo, Affondatore, Vesuvio, and Monzambano were told off to cover and mark the four corners of the area, each side of which was 4500 mètres in length, which was supposed to be occupied by the transports. The three contingents of torpedo-boats attached to the three divisions of the squadron covered the front of this area, and the other sides were protected by the three divisions themselves. The precise point of debarcation was left to be determined by circumstances as they arose.

Criticism of the dispositions adopted.

The disposition adopted appears to be open to criticism on more than one point. It seems to be based on the assumption that torpedo-boats attacking such a convoy might be expected to attack it from the front, and that other torpedo-boats might be relied upon to frustrate such an attack. Otherwise, if an attack, either from ships or torpedo-boats, was equally probable on any side, the force defending each side would presumably have been similarly composed of ships to encounter ships and torpedo-boats to encounter torpedo-boats. But, in the first place, the assumption that torpedo-boats would be more likely to attack such a convoy from the front is open to serious question, because, in that case, they would have to pass the transports assailed on opposite courses, and would thereby materially abridge the time available for the discharge of their torpedoes; and, in the second place, the assumption that torpedo-boats on the one side are the best or even a good answer to torpedo-boats on the other is one which will appear to many critics to be based on a radical misconception of the true function of torpedo-boats. These exceedingly fragile and delicate little vessels are far too precious to be expended on the mere destruction of their own kind. A torpedo-boat can on occasion and in favourable circumstances destroy or disable a battleship. Why, then, should it be wasted in destroying or disabling another torpedo-boat, a conflict in which it can make no use of its characteristic weapon, or at best can only employ it for a purpose wholly disproportionate to the means employed? But the question is one which nothing but actual experience can finally decide, and

actual experience of the kind required is not to be derived from peace manœuvres. A far more serious criticism of the Duke of Genoa's dispositions, or, rather, of the whole scheme of the operations, is that the idea of transporting a large body of troops across a sea in which a hostile fleet is still strategically at large is altogether inadmissible. Either Accini's squadron was capable of trying conclusions with that of the Duke of Genoa, hampered as the latter would be by the duty of protecting so vast and unwieldy a convoy, or it was not. In the latter alternative there was no problem to be solved. The defending squadron was not strategically at large in any real and practical sense, but had been neutralised by the overwhelming force of the convoying fleet—as the Russian Fleet was at the time of the landing in the Crimea—and the required command of the sea had been secured by the invading force before the beginning of the operations. In the other alternative, the risks to which the convoy was exposed must have been such that it is safe to say that they would never be faced by an invading force in actual war. Nothing but a certainty that each face of the convoy was defended by a force capable of disposing of any force that the enemy could possibly bring to bear on it could secure the convoy in the circumstances supposed against the imminent risk of overwhelming disaster. The destruction that a single well-handled ironclad could cause if it got into the midst of a large and compact convoy, consisting of defenceless transports loaded with troops, and unaccustomed to steam in company or to act in concert, is simply incalculable. On the other hand, if we are to assume that the force detailed for the defence of each face of the convoy was more than sufficient to cope with any force that the enemy could bring against it, then, no doubt, the command of the sea was secured, and one disposition was just as good as another; while, if we are to assume that the Duke of Genoa, when threatened with attack, would have time to concentrate the whole of his force on the front likely to be attacked, then the disposition adopted—a disposition to be abandoned as soon as danger threatened—would appear to be somewhat wanting in tactical purpose and actuality.

Conclusion of the operations.

Considerations of this order appear to have governed the dispositions of Accini, but he was not destined to bring his plans to a successful issue. After a festive armistice, devoted to the entertainment of the distinguished guests who witnessed the manœuvres, hostilities were resumed on September 1. The Duke of Genoa's scouting squadron was early at sea, but the convoy, with its escort did not leave Maddelena till towards evening. A course was shaped towards Monte Cristo, which was reached at daybreak on September 2.

Accini's plan was to gain touch with the expedition by means of his cruisers, and then, forcing himself into the midst of the convoy, to do all the damage he could. But he never had an opportunity of putting his plan in execution. At Monte Cristo the Duke was informed by his scouts that Accini was watching the Italian coast to the northward, and awaiting the approach of the expedition in that quarter. The Duke accordingly determined to avoid Accini's chosen position, and, turning his back upon him, to attempt a landing at Volturno between Gaeta and Naples. This was successfully accomplished on the morning of September 3, Volturno being reached without interruption, or even observation by the enemy, who failed even to put in an appearance during the six hours supposed to be occupied at Volturno in landing the troops. Nevertheless, the Re Umberto, Accini's flagship, had been observed by Admiral Bertelli and the umpire in chief on board the Trinacria off Cape Linaro, a little to the south of Civita Vecchia, on the afternoon of September 2. Cape Linaro is some seventy miles from Monte Cristo, which had been reached by the expedition on the morning of the same day, and the course from Monte Cristo to Volturno must have taken the attacking squadron within some fifteen miles of the same point. The failure of Accini to find and molest his adversary thus remains to a large extent unexplained and even unintelligible. However this may be, the arrival of the expedition at Volturno brought the operations to a final conclusion.

General remarks.

It is far from easy to discern in what single respect the three series of operations above described can be regarded as illustrating the peculiar and distinctive features of a so-called "guerre des côtes" as distinguished from the recognised historical characteristics of a struggle for the command of the sea. In the first phase of the operations the Duke of Genoa was twice interrupted in his demonstrations against the coast by the appearance of an inferior defending fleet, and with sound strategical instinct he recognised at once that his real objective was his enemy's fleet, and promptly abandoned his more or less theatrical demonstrations against the enemy's coasts. His attack on Accini in the Bay of Naples was strategically sound enough, since it represented his conviction that his aggressive designs must be paralysed so long as the defending fleet remained strategically at large, but its easy success remains for the most part inexplicable in the circumstances as described. The second phase of the operations—namely, the attack on Accini at Gaeta—appears to have been legitimately conceived in the same order of ideas, and to be based on the sound assumption that command of the sea will always be regarded as essential to such freedom of maritime aggression as a superior naval

force must seek to possess and exercise; but the tactical dispositions involved appear to be open to criticism at many points. The third phase of the operations was practically based on the assumption of an assured command of the sea. If this proposition is disputed, it must be acknowledged that the whole proceeding was strategically an absolute nullity. In order to render the supposed military expedition even colourably feasible, it was found necessary to reduce Accini's force to a mere skeleton, to add to the force at the Duke of Genoa's disposal all the strength that had been subtracted from Accini's, and to select as the basis of operations a position far nearer to the coasts of Italy than any at the disposal of the enemy supposed to be represented; for, though Corsica belongs to France, it possesses no inherent military resources capable of sustaining an important maritime expedition, and, if selected as the basis of such an expedition, must itself be supplied with the troops required by transport across a sea of which the command is *ex hypothesi* in dispute. Even so, with all these advantages in his favour—advantages which no real enemy would be likely to enjoy, at any rate at the outset of hostilities—it was recognised by the Duke of Genoa, as is shown by the whole character of his dispositions, that his undertaking was surrounded by immense difficulties and at least the menace of overwhelming disaster. He succeeded in traversing the sea without impediment and landing his troops unmolested. But to land an army in an enemy's country is only the first, and not necessarily the most difficult, part of the problem of invasion. Unless its maritime communications are secure, an army so landed is certain, sooner or later, to perish. If Accini was strong enough to attempt to intercept the expedition, he was also strong enough to interfere with its communications after it had landed. Thus, it was not enough to elude his force; he must sooner or later be brought to an action and defeated. In actual warfare this would certainly have to be done before such an expedition was undertaken. In manœuvres the order may often be inverted with apparent impunity, because the proceedings can always be suspended at a point where the further solution of the problem becomes embarrassing. But the stern reality of war allows no such liberties to be taken; and those who propose to violate the historic principles of strategy, as established by the experience of ages upon ages of warfare, must at least be prepared to show where those principles are at fault and how they can be bettered in the future. There is no single incident in the operations above described which can properly be held to show that a so-called war of coasts, as distinguished from a struggle for the command of the sea in dispute, is indicated as the naval strategy of the future by the methods, instruments,

and appliances of modern naval warfare. If the two things are identical, well and good. It is merely a question of terms, and on the whole there appears to be no good reason why the new term should be substituted for the old. But if the two things are different, then it still remains to be shown in what respect the new is, in any sense, better than the old.

III.—Russian and German Manœuvres.

Of other foreign manœuvres, the only accessible accounts are so meagre that it would scarcely be possible, even if space permitted, to examine them in any detail. It appears from the programme of the Russian manœuvres in the Baltic that the general conception of the operations was similar to that of the two previous years. Two squadrons were engaged, one the squadron of attack, commanded by Vice-Admiral Herken, and composed of the Emperor Alexander II., second-class battle-ship; the Admiral Spiridoff and Admiral Grieg, armoured coast-defence vessels; the Duke of Edinburgh, first-class cruiser; the Plastoun and Strélok, second-class cruisers; the Voevada, torpedo-cruiser, and three torpedo-boats: the other, the squadron of defence, commanded by Rear-Admiral Giers, and composed of the Groziashtchy and Gremiashtchy, armoured gunboats; the Tcharodeika, armoured coast-defence vessel; the Possadnik, torpedo-cruiser; the Rabotnik, special service vessel, and eight torpedo-boats. The Gulf of Finland was the scene of operations. The attacking squadron, which was supposed to be advancing from the Baltic, was first to establish its headquarters in the Möön Sound, and, proceeding thence along the southern shore of the Gulf of Finland, to endeavour to establish itself in the Biorke Sound, an anchorage some forty miles to the north-west of Cronstadt formed by an island lying off the port of Biorke. The object of the defending squadron was, by taking advantage of the islands and fiords lying along the northern coast of the Gulf of Finland, to impede, harass, and frustrate the operations of Admiral Herken. A chart of the scene of operations will be found in the *Naval Annual* for 1892. A theme of this character offers little or no scope for strategical developments, since the Möön Sound is less than 150 miles from Biorke Sound, and the operations contemplated appear to resolve themselves into a series of exercises in torpedo-boat attack and defence.

The German manœuvres were extended over a considerable period of time, the exercises preliminary to them having been begun early in April when two squadrons were mobilized and sent to sea, each

with a division of torpedo-boats attached. During April and May the ships and torpedo-boats belonging to these two divisions were exercised first singly and afterwards in combination. A third division of torpedo-boats was mobilized at the end of June. July and the beginning of August were also occupied in a variety of exercises at sea. The manœuvres proper began on August 20. At that time twenty-one sea-going ships of war, four divisional torpedo-boats, and twenty-four torpedo-boats were assembled at Kiel. After a preliminary cruise—again occupied with exercises of various kinds at sea—from Kiel to Wilhelmshaven and back again, the whole fleet was divided into two squadrons for the purpose of carrying out strategical and tactical operations in the maritime region adjacent to the mouths of the rivers Elbe, Weser, and Jahde. To one squadron, composed of the training-ships Stein, Stosch, Moltke, and Gneisenau, together with three divisions of torpedo-boats, was entrusted the defence of the coasts threatened with attack; the attacking squadron, on the other hand, consisted of two ironclad divisions with a contingent of torpedo-boats and a scouting division of cruisers. Heligoland was the central point of the operations, and here the defending force made a determined attack with its torpedo-boats on the hostile squadrons, but owing to the darkness of the night, this attack appears to have been unsuccessful. The manœuvres ended with a cruise of the combined fleets for the purpose of further exercises at sea. The strategical results of the operations appear to have been comparatively insignificant, but the determined and very business-like manner in which the German fleet is encouraged to devote itself to continuous exercises at sea and to the acquisition of practical sea experience, appears to afford an example which might be imitated with advantage by the fleets of other nations.

James R. Thursfield.

CHAPTER V.

TOULON AND THE FRENCH FLEET IN THE MEDITERRANEAN.

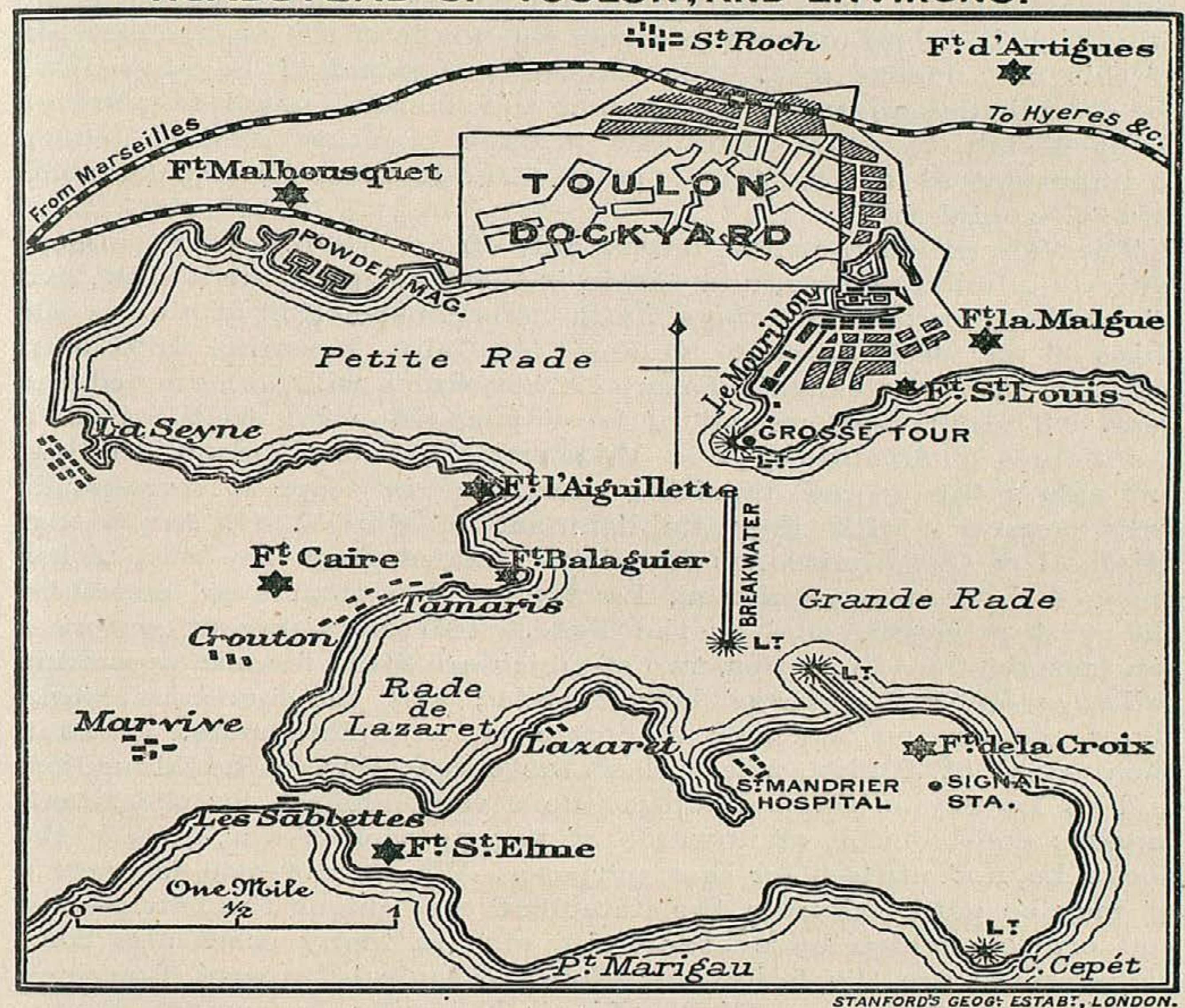
Rise of Toulon.

THE arsenal of Toulon, the chief seat of French naval power in the Mediterranean, and now one of the finest dockyards and strongest coast fortresses in the world, was created by Louis XIV. in 1680, the great Vauban being the engineer of the works, as he had previously been of those at the then very important port of Dunkerque. Toulon had been in some sense a naval station since the time of Henri IV., and in a still less degree since the time of Louis XII., who began the work which is called La Grosse Tour, at the extremity of the peninsula of Le Mourillon. The place was by no means formidable until Henri IV. ordered the building of an *enceinte* and of the old forts Sainte Catherine and Saint Antoine, as well as of the existing moles which embrace La Vieille Darse and of that part of the dockyard which immediately abuts upon it; and the establishments were still upon a very inadequate scale until Vauban began La Nouvelle Darse, or, as it is now called, La Darse Vauban, with rope-yards, sail lofts, armoury, gun-foundry, park of artillery, and building slips. At about the same period a new and larger *enceinte* was built, and fresh outlying forts were erected; and in 1689 Toulon became the official seat of the Vice-Amirauté du Levant, Tourville being the first Vice-Admiral in that office. Since then Toulon has steadily grown in strength and importance. Within, the arsenal has been extended by the addition of the Darse de Castigneau and the Darse Missiessy on the west, and of the great detached building establishment of Le Mourillon on the east; without, it has been improved by the construction of a magnificent breakwater and numerous modern forts, and by the creation, by private enterprise at La Seyne, of yet another huge building yard. To-day the water-space, within the moles, of the various basins that are available for men-of-war of all sizes amounts to about 150 acres; while the quayage is between three and four miles in length. Outside the artificially enclosed basins there is sheltered anchorage for the entire navy of a first-class power, supplemented by an additional mile and a half of quay accommodation, and by numerous pontoons, jutting out from the permanent quays and moles, and having deep water beneath them.

The situation of Toulon, as shown in the sketch map of the port and its environs, seems to mark it out as a site for a great naval station. The sketch does not indicate the depth of water, which is, however, all that need be desired over the greater portion of both roadsteads; neither does it indicate the commanding rise of the land to the north of the town, nor the various heights on the peninsula

Situation of Toulon

ROADSTEAD OF TOULON, AND ENVIRONS.



STANFORD'S GEOG' ESTAB', LONDON.

of Cape Cepét; for it has been thought unnecessary to encumber so small a map with such details. When it is recollected that behind the town is Mont Faron, 1910 ft. high; that this is crowned with forts mounting very heavy guns; and that all these guns are within about three miles, as the crow flies, of the main channel leading round the south extremity of the breakwater into the inner roadstead,

some idea may be formed of the security in which a fleet might lie in war-time in the Petite Rade, the approaches to which are still further protected by the exceedingly powerful works on or near the shore, both to the east and to the west of it.

The arsenal.

A plan of the arsenal itself is given upon a larger scale; and the various basins, docks, and chief buildings comprised within its wide limits are separately referred to in the accompanying notes. But, vast though the Government arsenal is, it should be borne in mind that it by no means represents the whole of the naval resources of this magnificent port. The subsidiary arsenal of Le Mourillon, the establishments at La Seyne, and the splendid naval hospital of Saint Mandrier, on the peninsula of Cape Cepét, all help to render it important as a naval base, and to make it exceptionally complete and self-contained.

Subsidiary establishments.

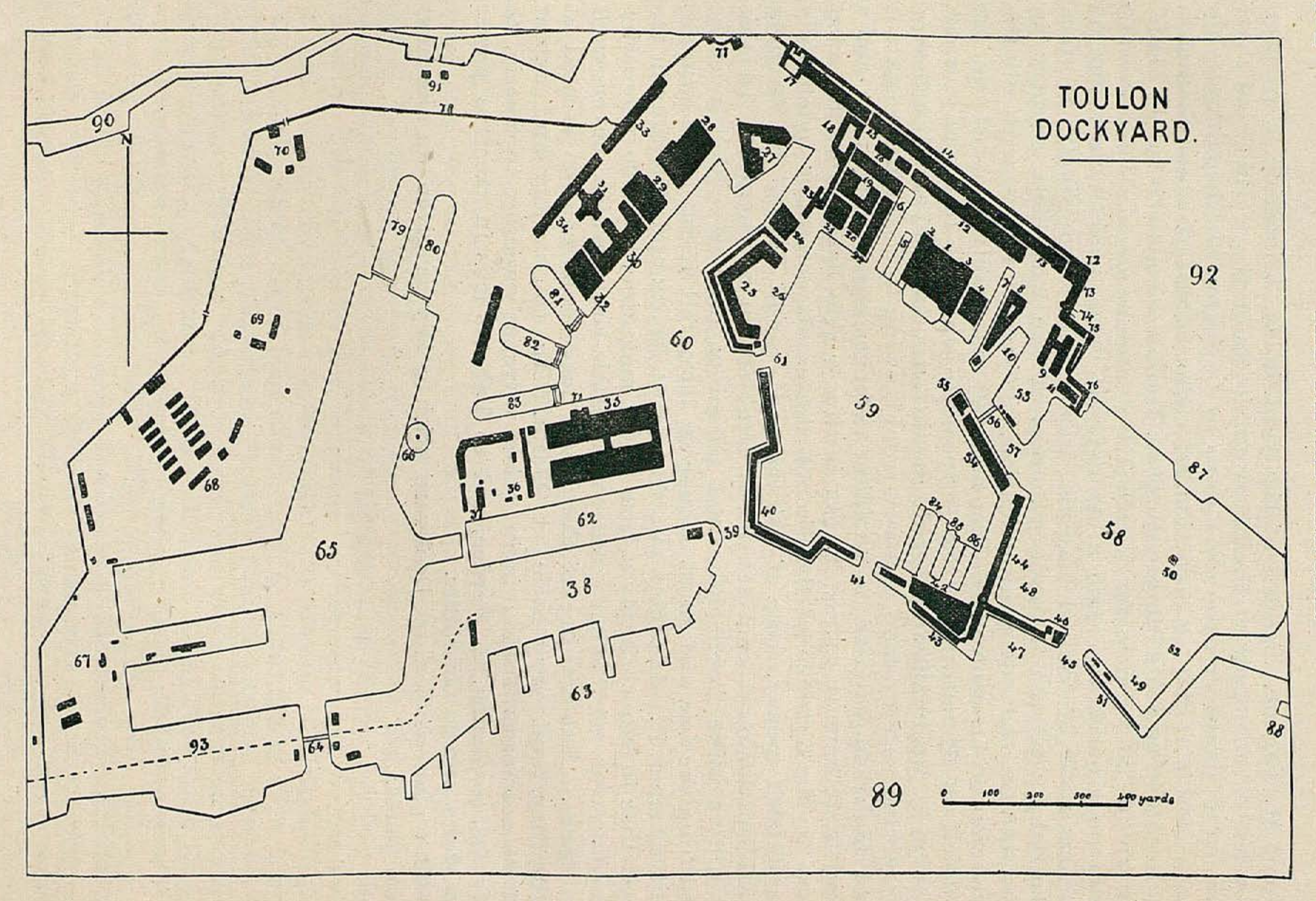
The Mourillon arsenal dates only from 1836. It is almost entirely a building-yard, and within it there are permanent slips, five of which are covered, for the simultaneous construction of nine or ten ships of war of large size. One of these slips has since 1891 been occupied by the battle-ship Lazare Carnot, which will be launched this year. The private arsenal of La Seyne, belonging to the Société des Forges et Chantiers de la Méditerranée, is not only a building, but also a fitting and repairing yard, and in scope it corresponds very generally with the establishment of Sir W. G. Armstrong, Mitchell & Co., Limited, at Elswick. Indeed, since the Société has engaged in gun construction, La Seyne more than ever resembles the great private arsenal on the Tyne. The establishment comprises ten masonry building slips, two of which are fitted for use as marine railways for the repair of large vessels; and the foundries, workshops, etc., are on the most elaborate and complete scale. Thus in the arsenal of Toulon, where there are three slips, at Le Mourillon, and at La Seyne, there are permanent conveniences for the simultaneous construction of upwards of twenty men-of-war, even if the docks be not utilised for that purpose. What La Seyne is capable of may be gathered from the statement that among the battle-ships and cruisers which have been built, and in many cases also completed there, are the following: *French*—Amiral Duperré, Bouvines, Jauréguiberry, Marceau, Cécille, Linois, Tourville, Inconstant, Papin; *Brazil*—Benjamin Constant; *Chile*—Capitano Prat, Presidente Errázuriz, Presidente Pinto; *Germany*—Friedrich Carl; *Greece*—Admiral Miaulis; *Holland*—Schorpioen; *Italy*—Maria Pia, San Martino, Formidabile, Terribile; *Japan*—Itsukusima, Matsusima; *Russia*—Yaroslav; *Spain*—Numancia, Pelayo, Puigcerda; and *Turkey*—Assar-i-Shefket, Assar-i-Tewfik, Nedjmi Shefket. At the present

time, M. Lagane, director of the yard, holds, I imagine, a position second to none amongst the naval architects of the world; and there can be no doubt that the work done by La Seyne, whether in war-ship or in merchant-ship construction, is of the highest and best character.

Regarded as a Mediterranean base, Toulon stands absolutely alone. It would be possible for a rich Power, possessed of the necessary vantage ground, to create a stronger or more perfect one; but no serious rival to Toulon has yet arisen, nor is one likely to arise. Backed by all the internal resources of the wealthiest country in Europe; in railway communication, by several routes, with all the manufacturing centres of France; and admirably adapted by art as well as by nature for the purposes to which it has been turned, Toulon is practically impregnable against a sea-attack, and, if attacked simultaneously by land and sea, would, owing to the immense extent and high command of its outlying defences, need much time and a very large force to reduce it. It is thus a safe base, no matter what may be the fortunes of the French fleets. It can exist indefinitely in its full power, even if all the seas round France be strongly held by the most comprehensive combination of enemies. In this it differs alike from Malta and Gibraltar, each of which must be fed from the sea, and must sooner or later fall if sea-borne supplies fail to reach it. It differs also from both Malta and Gibraltar in the fact that it is not simply a base and a magazine, but also a creative depôt. Out of Toulon can come battle-ships which never went in there. But nothing of the least importance can be created at Gibraltar, and very little at Malta. In the variety and extent of its resources Toulon is, in other ways, as superior to Spezia, to Naples, to Genoa, to Venice, and to Pola, as it is in creative power to Malta and to Gibraltar.

Toulon as a naval base.

The plan of Toulon Dockyard with a key is given on the next two pages.


TOULON
DOCKYARD.
0 100 200 300 400 yards
N

Key to the Plan of Toulon Dockyard.

1. The Mast House, with, on the first floor, the Mould Loft, one of the largest rooms in Europe.
2, 3. Covered building slips, of masonry.
4. Mast and Sail House.
5. A third building slip, of masonry.
6. Canal de la Garniture: the Rigging Basin.
7. Mast Pond.
8. Various offices. Near the north-east corner is the clock tower (Tour de l'Horloge).
9. Paint Stores.
10. Canal de la Tour de l'Horloge; the chief official landing place in the Dockyard.
11. Health and sanitary offices.
12. Foundries.
13. Rope stores and rope walk. The building measures 1050 feet by 65 feet.
14. Cable stores.
15. Wine and spirit stores.
16. Dockyard ambulance.
17. Naval prison.
18. Bedding, hammocks, and miscellaneous stores. Through these passes the Passage Dubourdieu.
19. Oil stores.
20. Oar-makers' sheds and stores.
21. Rolling mills: sheet iron stores.
22. Blocks and sail-makers' stores.
23. Locksmiths' shop and foundries.
24. Magazine of gun-mountings.
25. Gun-wharf and artillery park.
26. Gun foundry.
27. Bakery.
28. Boiler shops and stores.
29. Foundry.
30. Model rooms and fitting shops.
31. Motors driving the dockyard machinery.
32. Fitting shops.
33. Boiler stores.
34. Foundries and blacksmiths' shops.
35. Victualling establishment.
36. Timber and wood stores.
37. Slaughter house.
38. Coal stores and wharves.
39. Passe de Castigneau: entrance from the Petite Rade to the Darse de Castigneau.
40. Rigging stores.
41. Chaine Neuve: entrance from the Petite Rade to the Darse Vauban.
42. Joiners' and carpenters' shops.
43. Convict establishment.
44. Convict hospital.
45. Chaine Vieille: entrance from the Petite Rade to the Vieille Darse.
46. Guard house.
47. Outside this mole torpedo-boats are moored.
48. Along this quay torpedo-boats are moored.
49. Here also torpedo-boats are moored.
50. "La Pile."
51. Naval barracks.
52. Here naval hulks, receiving ships, and vessels in ordinary lie.
53. The old building yard.
54. Boat houses.
55. Pitch-house.
56. Swing bridge.
57. Canal de Mange-garri: entrance to the Darse Vauban from the Vieille Darse.
58. The Vieille Darse, or Old Wet Dock, the central section of which is given up to pleasure boats and to local steamer traffic, while the two side sections, which are portioned off by means of booms, are monopolised for government purposes. Water surface about 200,000 sq. yards.
59. The Darse Vauban. Water surface about 180,000 sq. yards.
60. The Darse de Castigneau. Water surface about 115,000 sq. yards.
61. The Coupure de l'Artillerie: entrance to the Darse de Castigneau from the Darse Vauban
62. Canal du Parc au Charbon et des Subsistences. Water surface about 36,000 sq. yards.
63. Pontoons, numbered, beginning at the east end, from No. 1 to No. 9. Alongside these ships of all sizes may lie.
64. Swing bridge, over the entrance from the Petite Rade to the Darse Missiessy.
65. The Darse Missiessy. Water surface about 200,000 sq. yards.
66. Reserve of heavy guns of all calibres, and crane for hoisting them on board ships alongside.
67. Naval barracks.
68. Barracks of Infanterie de la Marine.
69. Barracks of Gendarmerie Maritime.
70. Barracks of artillery workmen.
71. Pitch house.
72. Majorité: office of the Admiral Superintendent.
73. Offices.
74. Main entrance to the Dockyard and Arsenal. The straight road hence, through an archway in 18, to 77, is overshadowed with trees.
75. Whitesmiths' shops and stores.
76. Health Office (La Consigne).
77. Post of Gendarmerie Maritime, close to the city gate called the Porte Nationale.
78. Dockyard wall. The ground outside this on the west belongs to the War Department.
79. Dry Dock (No. 1 Missiessy): length over all, 426 ft. 6 in.; width at entrance, 88 ft. 2 in.; depth on sill at high water, ordinary spring tides, 32 ft. 9 in. (There is practically no tide.)
80. Dry Dock (No. 2 Missiessy): a counterpart of 79.
81. Dry Dock (No. 1 Castigneau): length over all, 326 ft. 4 in.; width at entrance, 62 ft. 3 in.; depth on sill, 29 ft.
82. Dry Dock (No. 2 Castigneau): length, 385 ft. 6 in.; width at entrance, 62 ft.; depth on sill, 30 ft. 10 in.
83. Dry Dock (No. 3 Castigneau): in two sections. West section: length, 295 ft. 2 in.; width at entrance, 65 ft. 7 in.; depth on sill, 29 ft. East section: length, 236 ft. 2 in.; width at entrance, 62 ft.; depth on sill, 31 ft. 2 in.
84. Dry Dock (No. 3 Vauban): length, 283 ft.; width at entrance, 53 ft. 9 in.; depth on sill, 24 ft. 6 in.
85. Dry Dock (No. 2 Vauban): length, 246 ft.; width at entrance, 54 ft. 8 in.; depth on sill, 20 ft. 3 in. Built in 1830.
86. Dry Dock (No. 1 Vauban): length, 246 ft.; width at entrance, 53 ft.; depth on sill, 19 ft. Built in 1776.
87. Quai du Port: scene of the massacre of 1793.
88. Mole, south of which is the entrance to the Commercial Harbour.
89. The Petite Rade, the greater part of which is covered with mooring buoys for men-of-war.
90. The enceinte of the city.
91. The Porte Missiessy.
92. City of Toulon.
93. Dockyard Railway, connected with the main line to Marseilles.

The Mediterranean Fleet.

Toulon is the great centre and headquarters of French naval strength in the Mediterranean, but the extent of that strength cannot be fairly gathered from any mere inspection of the resources of the port, nor from any survey of the natural and artificial advantages of the position as a strategic base. Toulon is defensively strong without the assistance of any naval force; it is offensively strong inasmuch as it is the port of a splendid fleet, a great part of which is perpetually kept ready, as the saying has it, to go anywhere and do anything. I will not here enumerate the vessels which I saw in the Lesser Roadstead and in the various basins and docks when I visited Toulon in order to witness the arrival of the Russian Mediterranean Squadron in October, 1893. I shall, I hope, serve a more useful purpose if I describe the French Mediterranean Fleet as it is at the time of writing—that is, in March, 1894. About the beginning of that month our neighbours had in full commission in the Mediterranean, and in partial commission (as belonging to the Reserve), the following vessels, which, with the exceptions indicated, constituted the "Escadre de la Méditerranée":—

In Full Commission.

Battle-ship	Amiral Baudin
,,	Amiral Duperré
,,	Dévastation
,,	Formidable
,,	Hoche
,,	Magenta
,,	Marceau
,,	Neptune
Cruiser, 1st Cl.	Alger
,, ,,	Tage
,, 2nd Cl.	Davout
,, 3rd Cl.	Cosmao
,, ,,	Hirondelle‡
,, ,,	Faucon
,, ,,	Vautour
,, ,,	Wattignies
Torp.-Gunboat	Bombe
,,	Couleuvrine§
,,	Léger
,,	Lévrier
Sea-going T. B.	Audacieux
,,	Chevalier
,,	Corsaire
,,	Kabyle
,,	Mousquetaire
,,	Téméraire
First-Class T.-B's., 13 *	
Second-Class T.-B's., 13 *	
Third-Class T.-B's., 2 *	
T.-Vedette boats, 6 *	

In Partial Commission.

Battle-ship	Colbert
,,	Richelieu
Armoured Cruiser	Bayard†
Armoured C. D. vessel	Caïman
,, ,,	Indomptable
,, ,,	Terrible
Armoured Gun-vessel	Achéron*
Cruiser, 3rd Cl.	Forbin
,, ,,	Milan
,, ,,	Condor
Torp.-Gunboat	Dague
,,	Dragonne
,,	Flèche
Sea-going T.-B.	Agile
,,	Aventurier
,,	Éclair
,,	Orage
First-Class T.-B's., 9 *	
Second-Class T.-B's., 24 *	
Third-Class T.-B's., 8 *	

* Belonging to Défense Mobile.
† About to supersede the Triomphante as flagship in China.
‡ Coast of Tunis.
§ Coast of Algeria.

Number of ships at Toulon.

Repairing, undergoing alterations of boilers or armament, or not in commission, France had at Toulon the battle-ships Friedland, Redoutable, Océan, Trident, and Courbet, the first-class cruisers Cécille and Sfax, and about thirty torpedo-boats of various types, including the submarine boat Gymnote, besides small craft. Completing she had the Jauréguiberry, the coast-defence (really second-class) ironclad Bouvines, the second-class cruiser Suchet, the third-class cruiser Linois, and the submarine boat Gustave Zédé; and building she had the battle-ship Lazare Carnot, the first-class cruiser d'Entrecasteaux, and the second-class cruiser Pascal. She had, further, in commission, the sea-going gunnery training-ship Couronne, and its tender the Cacique (*ex* St. Louis), the sea-going torpedo training-ship Algéciras, and a due proportion of the tugs and harbour vessels that are necessary to a great naval port. Excluding these, however, for the present, and summing up, Toulon was at the beginning of March either the actual station or the general head-quarters of the following fighting vessels in the Mediterranean :—

	In Commission.	In partial Commission.	In Ordinary, Repairing, or Building.	Totals.	
Battle-ships	8	2	7	17	23 armoured.
Armoured Cruisers	—	1	—	1	
Armoured C. D. Vessels	—	3	1	4	
Armoured Gunvessels	—	1	—	1	
Cruisers, first-class	2	—	3	5	141 protected or unarmoured.
,, second-class	1	—	2	3	
,, third-class	5	3	1	9	
Torpedo Gunvessels	4	3	—	7	
Sea-going Torpedo-boats	6	4	—	10	
Other Torpedo-boats	34	41	*30	105	
Submarine Torpedo-boats	—	—	2	2	

* Approximately.

Readiness for service.

I do not here include several very obsolete and practically useless craft, though I do include some ironclads which are not, in their present condition, fit for much sea-work. Nor should it be forgotten that all the armoured coast-defence vessels appearing above are notoriously quite able to take their places in the line-of-battle in waters such as those of the Mediterranean, and would, if they were British and not French, be classed (as, in fact, they were classed in the last Parliamentary Return of Navies) as second-class battle-ships. It is no exaggeration, therefore, to say that if, at the beginning of March, France had at a few hours' notice been obliged to fight a fleet action in the Mediterranean, she could have put into the line-of-battle thirteen ships at least. Neither is it an exaggeration to say that, with only the same number of hours' notice, no other Power could have met her with a numerically equal force of

vessels fit for the line. And I ought, perhaps, to here explain that in saying "fit for the line," I by no means wish to suggest that there will ever again be "a line" in the old sense. It is possibly significant of the future fighting formation, that out of the thirteen battleships and armoured coast-defence vessels wholly or partially commissioned, and forming the strength of the French Mediterranean Fleet, no fewer than five carried flags.

State of the fleet.

The fleet was, practically, much the same in March as it had been when I saw it in October, 1893; and, although English people have shown that they do not like to hear the language of laudation applied to foreign navies, and French people have since taken to decrying their own, there is no doubt that the French put before their Russian guests a fleet of which any nation in the world might be very proud indeed. Not only was it a modern fleet (the average age of the ships being somewhat less than that of our ships on the station at the same time), and a fast fleet; not only was it a well-armoured and a well-armed fleet (it mounted 654 guns as compared with only 592 in our Mediterranean Fleet); but it was emphatically a well-ordered, a well-officered, and a well-manned fleet. The condition of the ships and guns (and I was allowed to be very inquisitive) left very little to be desired; the men were clean and exceedingly smart and willing at their drills, etc., and the officers, though not for the most part particularly smart in carriage, nor even careful in dress, seemed remarkable for those valuable combined qualities of knowledge, experience, and keenness, without which good officers cannot exist. There can, so far as outward appearances are concerned, be no greater contrast than is to be found between the typical French and the typical German naval officer. Each is, I believe, excellent; but while the Frenchman by look, by language, by gesture, by gait, and by the manner in which he wears his clothes, betrays the seaman, the German by all the corresponding tokens disguises it. Indeed, it has often struck me as curious that Germany is the only country, of any naval significance, whose sea-officers do not appear, as a race, more or less distinct from her civilians and her land-officers. In the French Navy the distinction crops up more markedly than I have ever elsewhere noticed it, and, to my mind, the fact is one of many small signs that the French Navy, no matter what some may choose to say to its disadvantage, is—at least as concerns its officers and men—in a splendidly healthy condition. Its home critics, there is no denying, have experienced great difficulty in their efforts to seriously disparage it. They have not dared to say anything against officers or men; they have fought shy of attacking the ships since their exaggerated allegations concerning the stability of the Magenta were shown to be almost baseless; and

their assertions as to mismanagement in the dockyards and deficient organisation for war really amount to little more than new statements of the old truism that everyone is liable to make mistakes, bad bargains, and miscalculations. The French Mediterranean Fleet is a magnificent force; and every French naval officer is aware of and proud of the fact. That individual ships could be improved upon needs no admission. Every modern ship is a compromise. But merely because the Magenta and some other vessels have an amount of superstructure and gear above it that would be terribly productive of splinters in action, and because, in certain circumstances, they roll, as all vessels must, the ships do not deserve sweeping condemnation; and, so far as I can see and learn, that is their most conspicuous fault. On the other hand, there are many points in which the French battle-ships compare favourably with ours. They are less easy to sink; they are more comfortable on the lower decks; they are better prepared than ours are against the eventuality of the conning tower being rendered useless in action, and the ship having to be fought from some other position; and they are, upon the whole, very good gun-platforms.

Local officials.

Toulon is the headquarters of the 5th Maritime Arrondissement; and there are consequently employed there several flag officers in addition to the five who hold commands in the Mediterranean Fleet. These are the Préfet Maritime, a vice-admiral, who is commander-in-chief; the Major Général de la Marine, a rear-admiral; and the Major de la Flotte, another rear-admiral. The functions of these may be roughly explained as those of a port admiral, an admiral superintendent, and a chief of the staff respectively. The Préfecture Maritime, a handsome building to the immediate north of the eastern end of the dockyard limits, overlooks the Place d'Armes, and is conveniently close to the various offices, which include those of the Commissaire Général (chief accountant officer), the local Director of Naval Construction, the Director of Artillery, the Director of Hydraulic Works, the Director of the Sanitary Service, the Inspecteur en Chef, and the Director of Submarine Defences.

Submarine boats.

The mention of submarine defences reminds me that, while at Toulon, I saw in the Darse Missiessy the famous submarine boat Gustave Zédé, which, it is alleged by French officers, satisfactorily solves all the main difficulties connected with submarine navigation. She lay, almost awash, by the quay, with her man-hole or entrance-scuttle invitingly open, and a plank thrown across to it; but, although there was no one in her neighbourhood, a warning notice, prohibiting even naval men from visiting her, caused me at once to withdraw to a respectful distance, lest I might be accused of

unduly taking advantage of the liberty accorded to me. I have, therefore, no means of judging to what extent the claims made on her behalf can be maintained. But it can scarcely be doubted that she represents a very distinct advance upon all other vessels of the kind, and that the question of submarine navigation is rapidly approaching a point at which it will demand from this country far more attention than it has hitherto received. She is quite a large craft, being 131 ft. long, but, owing to difficulties with her motors, she is not yet finished.

Training establishments.

Toulon is also the headquarters of the chief gunnery and torpedo training establishments of the French Navy. Both these establishments differ radically from the corresponding establishments in this country, in so far as they are carried on in sea-going ships, instead of in purely harbour vessels or on shore. The chief gunnery establishment consists of the Couronne, an early broadside ironclad, which was built in 1861. She has an iron hull and is rigged. Her dimensions are: Length, 260 ft.; breadth, 54 ft. 3 in.; extreme draught, at a displacement of 6000 tons, 25 ft.; and she has engines of 800 horse-power nominal, and carries 33 guns of various types. The ship, by the way, is unlike any other ironclad, for behind her external 4-in. armour she has 3·7-in. backing, then another 1 in. of armour, and finally 11·2 inches of wood. Attached to the Couronne is the wooden screw third-rate Cacique (formerly St. Louis), which was launched at Brest in 1854 as an 80-gun ship. She is of 3400 tons measurement, and of 400 horse-power nominal, and, like the Couronne, is rigged. These two vessels have about 770 officers and men on board, and spend a considerable part of the year up and down the coast, so that their crews gain some experience in seamanship as well as much in gunnery. The large iron transport Calédonien has been ordered to be fitted to take the place of the Cacique. She is of 4455 tons displacement, and was built in 1884. The torpedo establishment consists of the wooden screw second-rate Algéciras, which was launched at Toulon in 1855 as a 90-gun ship, and later, I believe, used as a transport. She is of 5140 tons displacement and 2430 indicated horsepower, and, like the Couronne and St. Louis, goes up and down the coast. To the Algéciras is annexed the Japon. The reputation of these schools is very high, and I do not believe that the Excellent and the Cambridge on the one hand, or the Vernon and the Defiance on the other, are more efficient. They have, moreover, for years been under the command of officers of the most brilliant scientific attainments. Whether sea-going gunnery and torpedo establishments are, upon the whole, better than stationary ones may be doubted, but they certainly offer some obvious advantages; and in France the balance

of naval opinion seems to be decidedly in favour of their maintenance in the future as in the past.

I ought not to conclude this brief and incomplete notice of Toulon and its resources without mentioning the admirable system of mobile defence, which is centralised on board the old frigate Cérès, wherein are borne, among other officers, the lieutenants commanding the numerous torpedo-boats forming part of the "défense mobile du port," and also the lieutenant in charge of whatever torpedo-boats may be undergoing their trials. She is a depôt of provisions and stores for the crews of the boats, and can supply them with water, coal, compressed air, etc., or undertake repairs. The boats of the défense mobile are being continually exercised, the regulations directing that they shall make two night sorties every month, and that at least once a quarter they shall undertake systematic manœuvres against a skeleton enemy. Moreover, every boat in commission is required to fire a torpedo at least thrice a month, the boat being under way; and at least twice a month the boat must be travelling at high speed and the target must be moving.

Défense mobile.

WM. LAIRD CLOWES.

CHAPTER VI.

Comparative Strength.*

Let us ask ourselves why it is that the public mind at home is once more disturbed and anxious with reference to the state of the Navy. The reason is obvious. A Russian squadron has recently visited Toulon, and has there been received by the French people with an effusion of welcome which could hardly have been exceeded if Russia had rendered the most conspicuous services to the French people. The visit of the Russian fleet has drawn attention more particularly to the relative strength in the Mediterranean. It has been discovered that our squadron, as at present constituted, is inferior to the French squadron in the Mediterranean, and still more to the French, supplemented by the Russian squadron.

French and Russian forces in Mediterranean.

The French squadron permanently commissioned consists of eight battleships, three protected cruisers, four look-out ships, three torpedo-gunboats, and six sea-going torpedo-boats. In reserve, and commissioned for six months only, the French have five ironclads, mostly of the second class; one armoured cruiser, one protected cruiser, two look-out ships, three torpedo-gunboats, and four sea-going torpedo-boats.† The Russian squadron which visited Toulon consisted of five ships: the second-class battleship Emperor Nicolas I., the armoured cruisers Admiral Nachimoff and Pamyat Azova, the protected cruiser Rynda, and a gun-vessel. ‡

British fleet in Mediterranean.

The British fleet actually in commission in the Mediterranean is considerably inferior to the combined squadrons of France and Russia. It consists of ten battleships, nine of which are of the first class, two first-class cruisers, four second-class cruisers, four look-out ships, the torpedo-ram Polyphemus, the torpedo depôt ship Vulcan, two torpedo-gunboats, five smaller vessels, a coast-defence ship, and twelve torpedo-boats. It is reported in the Service papers that the Revenge will relieve the Rodney in April, and that the latter ship will then proceed to the Mediterranean. The Mediterranean squadron will then include the battleships Hood, Ramillies, Nile, Trafalgar, Sanspareil, and five "Admirals." It would be easy to reinforce our Medi-

* The groundwork of this chapter is an address by Lord Brassey to the Calcutta Chamber of Commerce, in December last, which has been revised and brought up to date.

† From *Le Yacht*, February 24th. *Cf.* p. 124 for names of ships.

‡ The Admiral Nachimoff and Rynda have since left for Vladivostock.

terranean fleet by detaching ships actually in commission in the Channel fleet, and in our Reserve squadron at home. I should deprecate any steps which, while it would add nothing to our effective squadron in case of war, would certainly be calculated to excite emulation in naval preparations. By inciting France to fresh efforts it must involve the necessity for throwing heavier burdens on our own Exchequer.

In considering our naval position, we must take into view our fleet as a whole. A comparison extending beyond the limits of the Mediterranean will show that our force in commission is not far below that standard of equality to any two Powers, which was laid down by the late Government, and was accepted, without question, by Parliament. As I have shown, we have a decided inferiority in the Mediterranean. That inferiority disappears when we take into the comparison our Channel fleet and Reserve squadron. Our Channel fleet consists of four first-class battleships, three being of the Royal Sovereign class, two armoured cruisers, and two fast smaller vessels. In the Home ports, manned with reduced crews, which can at a day's notice be completed from the Coastguard, we have a Reserve squadron consisting of four efficient second-class battleships, four armoured cruisers, and two protected cruisers. In addition, we have three second-class battleships and one coast-defence ship in commission as port-guard ships. Without including ships in the Fleet Reserve, or such ships as the Conqueror and Hero, which are attached as tenders to the Cambridge and Excellent, our aggregate strength in Home waters is eleven battleships, six armoured cruisers, one coast-defence ship, two second-class cruisers, and three torpedo-gunboats. The effective strength has been much increased during the past year, as the older ships in commission in Home waters have been replaced by more modern vessels.

The French Channel fleet is weak in comparison with the force which it is their policy to keep concentrated in the Mediterranean. Their Northern squadron, answering to our Reserve squadron, consists of two battleships, three coast-defenders, one armoured cruiser of the oldest type, two second-class cruisers, one look-out ship, one torpedo-cruiser two torpedo-gunboats, and four sea-going torpedo-boats. Half of these are in reserve. They are manned with full crews for six months only. An armoured gunboat is stationed at Dunkirk. French Channel fleet.

I have not included torpedo-boats in this statement of the British force in commission in Home waters. As it is seen every year, during the far too short period when vessels are specially commissioned for the manœuvres, we have a large number of torpedo- Torpedo-boats.

boats ready for sea at short notice. We have no inferiority to the French in torpedo-boats for the defence of our own coasts. In the Mediterranean we are weak. Looking, however, to the torpedo-boat as chiefly valuable for coast and harbour defence, we should naturally expect to find that the French, who have a long line of coast and important harbours to defend, would be superior to England in a naval arm which is more often a hindrance than a help to those in command of sea-keeping squadrons.

Ships in commission—in European waters.

Having examined the composition of the several squadrons in detail, we find the aggregate strength of ships in commission or partial commission in European waters to be as follows :—

	England.	France.
Battleships	21	15
Coast-defence Ships	1	3
Armoured Cruisers	6	2
First and Second Class Cruisers . . .	4	6
Look-out Ships and Torpedo-cruisers . .	5	8
Torpedo-gunboats	5	8

—in Eastern waters.

It will be of interest to the members of the Calcutta Chamber of Commerce if I briefly compare the relative force of England and France in Eastern waters. On the Pacific, China, and East Indian stations, the French have one armoured cruiser, one second-class cruiser, four third-class cruisers, nine sloops and gunboats.* In Eastern Siberia, or *en route* to the station, the Russians have one armoured cruiser, two protected cruisers, four sloops, and two gun-vessels. We have in commission in Eastern waters one coast-defence ship, two armoured cruisers,† two second-class protected cruisers, five third-class protected cruisers, two second-class and ten third-class unprotected cruisers, thirteen sloops and first-class gunboats, two torpedo gunboats, and two smaller gunboats. The Boadicea is, I understand, to be shortly replaced by one of the new first-class cruisers as flagship on the East Indian station. In this list the ships in reserve in Australia and Bombay are not included. Under actual conditions it is clear that no anxiety need be felt as to our power of holding our own in the Eastern seas.

Total forces available.

I have already observed that in comparing our naval position to that of other Powers, we must look not at any particular squadron, but at the collective force in commission. The true measure of our strength must be taken on a still wider comparison. We should look at the whole available force of efficient fighting ships on the respective Navy lists as well as the ships under construction, which are given

* From *Le Yacht*, February 24th.

† The first-class battleship Centurion is on her way to relieve the armoured cruiser Impérieuse in China.

in the comparative tables in Part IV., and of which the following is a summary, excluding ships not yet laid down* :—

Class.	England.			France.			Russia.		
	Built.	Bldg.	Total.	Built.	Bldg.	Total.	Built.	Bldg.	Total.
Battleships—									
1st class	19	3	22	10	7	17	5	5	10
2nd class	14	...	14	9	2	11	4	3	7
3rd class	10	...	10	6	...	6	...	...	...
Total—Battleships .	43	3	46	25	9	34	9	8	17
Coast-defence Ships . .	12	...	12	14	2	16	13	2	15
Cruisers—									
Armoured	18	...	18	9	4	13	9	2	11
Protected 1st class . .	11	2	13	2	2	4	...	...	...
„ 2nd & 3rd class .	46	8	54	6	12	18	2	...	2
Total—Cruisers . .	75	10	85	17	18	35	11	2	13
Look-out Ships	19	...	19	12	...	12	...	...	...
Torpedo Gunboats . . .	...	...	32	11	2	13	8	...	8
Slow Cruisers of old type .	27	...	...	22	...	...	...	...	...

How do we stand in ships completed in comparison with France and Russia combined?

Battle-ships.

In answering this question, I will deal first with the line of battle-ships. Nothing will compensate for any inferiority in this essential element of naval power. On battleships our command of the sea depends, and in this class of ship it is all important that we hold an indisputable supremacy.

1st class.

In first-class battleships which are practically completed we are, at the present moment, or shall be at the conclusion of the present financial year, well up to our accepted standard of strength. We have nineteen ships, as against ten French and five Russian ships. Amongst the nineteen British ships are included eight splendid vessels of the Royal Sovereign class, far superior in every point of fighting efficiency to any ships as yet completed for the French or Russian fleets.

2nd class.

Turning to battleships of the second class, we have fourteen ships to nine French and four Russian. The Hercules and Sultan are included in the second class. The former has been and the latter is being refitted. The French list includes four ships, with a powerful main armament and fair protection, but of low free-board. Such ships are effective for coast defence; they cannot be reckoned as fit for keeping the seas. In the second-class battleships we are barely up to standard.

3rd class.

In battleships of the third class, the British Navy has ten ships

* Excluding Jeanne d'Arc, E 4, 5, 6, and S 3, and those in note on p. 134.

to six French and Russian none. In this class we are above the standard. Our superiority is due mainly to the fact that our ships are of iron, while, with one exception, those of the French are built of wood. And now, having enumerated the ships, it will be appropriate to insist that the failure to attain our standard of strength in the second class is not the chief cause of anxiety. It is when we turn to the ships under construction that our deficiency is most apparent. The battleships under construction are given in the following table:—

BATTLESHIPS BUILDING.*

England.		France.		Russia.	
Name.	Tonnage.	Name.	Tonnage.	Name.	Tonnage.
Majestic . .	14,900	Bouvet . .	12,012	Poltava . .	10,960
Magnificent .	14,900	Charles Martel .	11,694	Petropavlosk .	10,960
Renown . .	12,350	Charlemagne .	11,800	Sevastopol .	10,960
		Jauréguiberry .	11,630	Three Saints .	12,480
		Lazare Carnot .	11,810	Paris . . .	12,480
		Massêna . .	11,730	Gangut . .	6,590
		St. Louis . .	10,800	Cizoi Veliky .	8,880
		Bouvines . .	6,605	„ „ (No. 2)	8,880
		Trèhouart . .	6,605		
3 Ships.	42,150	9 Ships.	94,686	8 Ships.	82,190

These tonnages are those given in the Parliamentary Return.

We have in construction three battleships only: the Renown, Magnificent, and Majestic. The two latter, which are hardly commenced, are more powerful than any in hand elsewhere. The French are building no less than nine battleships, two being of the second class. The Russian list comprises eight ships, three of which are of the second class. While therefore we have only three ships in construction, we find that no less than seventeen are building in France and Russia. We may be able to build, and we do build more rapidly than has hitherto been found to be practicable abroad. With every allowance for differences in the rate of advancement in shipbuilding, it is clear that further exertion on our part can no longer with safety be postponed. We want from the Admiralty, after due deliberation, a new and comprehensive programme of construction.

We may now turn to the various types not included in the lists of battleships. For these we do not distinguish between ships built and building.

Coast-defence ships. In coast-defence ships we are weak, though not nearly so weak as we should have appeared to be if we had made no modification in the list given in the Comparative Tables of last year. The British

* This Table does not include projected ships, viz. seven British battleships, the French Henri IV., or the Russian Cizoi Veliky (No. 3).

Empire possesses twelve coast-defence ships; France, fourteen; and Russia, thirteen. The British list includes the Abyssinia, Magdala, and Cerberus. The French list includes eight armoured gunboats; Russia has two built and one building, of the same class. The Jemmapes and Valmy are included in this class, though for certain purposes they may be considered as battleships. A few further words of explanation are necessary. Four French wooden ships of the Bouledogue type, and eleven small Russian ships of about 1500 tons, dating from 1864, have been struck out of the lists. Similarly, we have excluded the Viper and Vixen, which do not appear in the return relating to the principal navies presented to Parliament in December last, and the Scorpion, Wivern, and Prince Albert, which do. These last three vessels date from 1865–66, and cannot be considered more efficient than the Bouledogue class. With regard to the coast-defence class, it must always be borne in mind that while they are a force with which the Power which seeks to hold the command of the sea is obliged to reckon, in the case of an enemy, they are not a force on which she is able to reckon herself. With the possible exception, in certain circumstances, of the Belleisle, Orion, Rupert, and Hotspur, Great Britain has no coast-defence ships which could be used in the blockade of a hostile port.

Passing to the vessels whose special mission it would be to give protection to commerce, we have eighteen armoured cruisers completed, compared with thirteen French and eleven Russian ships built and building. The British and French lists each includes six of the earlier armour-clads. With one exception the Russian list comprises modern and effective ships. Our strength in this class is far less than we could wish. Armoured cruisers.

Of first-class protected cruisers we have thirteen built and building, to four French and no Russian ships of this class. Amongst the British ships are included the Powerful and Terrible of 14,000 tons, intended as an answer to the Russian Ruriks. If the system of protection adopted in our first-class cruisers is, as it is asserted to be, as effective as a belt of armour on the side, these two classes may be reckoned together. The position would then be: England, thirty-one; France and Russia combined, twenty-five. First-class cruisers.

We have fifty-four protected cruisers of the second and third classes with a speed of over sixteen knots, to twenty-four French and Russian ships. We have twenty-seven older cruisers, eighteen of which are partially protected, whose speed does not exceed fourteen knots. The French have twenty-two ships whose speed is in most cases one to two knots better than that of the British ships. In this class we are apparently up to our standard of strength; Smaller cruisers.

but when we take into consideration the fact that the aggregate mercantile tonnage of the British Empire is 12,455,087, valued at £122,000,000, and that the aggregate tonnage of the French Mercantile Marine was 1,057,708 in 1892, valued at £10,100,000, while the Russian Mercantile Marine was 481,799, valued at £3,000,000, it would be rash to assert that our force in cruisers is sufficient to protect the enormous interests involved. In concluding this comparative review it may be mentioned that we have nineteen look-out ships to six French. The Russians have no ships in this class. We have thirty-two torpedo-gunboats to thirteen French and eight Russian.

Dimensions and numbers.

One general observation, and not less obvious, may perhaps be made. In a comparison of strength, resting entirely on the number of ships, we do scant justice to ourselves. Our construction in the class of battleships has for some years been limited to ships of a size quite unmatched by any other navy, except that of the Italians. We may fairly credit our naval architects with ability to make the force of the ships produced from their designs proportionate to their tonnage. If we had kept the average tonnage of our recent battleships within the limits accepted by the French we should have made a better comparison in point of numbers. I have always been against the policy of putting too many eggs in one basket; and I hold the same opinion still. The largest ship of war must always remain, in some respects, as vulnerable as ships of moderate dimensions. In the Great War numbers were found by experience to be more important than the size and power of individual ships. Nelson's victories at the Nile and at Trafalgar were obtained by concentrating a superior number of his ships on an inferior number of the enemy's ships. We have in the Royal Sovereign class a sufficient number of huge vessels to deal with the larger ships building for France and Russia. In my view the naval requirements of the country would be far better served at the present moment by the construction of a larger number of vessels of the dimensions of the Centurion and Barfleur, than of a smaller number of vessels of the dimensions of the Majestic and Magnificent.

Our comparison being confined to ships specially built for war, has necessarily left out of view the relative resources of the British Empire, and those at the command of our rivals. If those resources be called upon before it is too late, we need entertain no apprehensions as to the continued maintenance of our beneficent influence for the spread of trade, commerce, and the civilisation which will surely be given in time to every land where our administrators and merchants are found.

CHAPTER VII.

OUR STRATEGIC POSITION IN THE MEDITERRANEAN.

THE difficulties which arise in our minds in considering the strategic position in the Mediterranean are not perhaps so inherent in the question itself as in the great variety of views held and expressed upon it. Good authorities have put forward totally opposite conceptions of our proper action in that sea during war; and others, equally deserving of attention, seem to have left out vital elements in their enunciation of the problem. Probably the diversity of view proceeds more from this cause than from any other; but notwithstanding, many of us have got so far in establishing our hypothesis as to predicate the place and the nature of the great sea-fight which is to determine the future course of the war in that sea.

It seems clear that we must not omit any single element in the data on which we are to build up our conclusions. If we leave out one, experience shows us that we shall fail to make any step in advance of our present contradictory and unsatisfactory views.

Some note of these divergent conceptions may usefully be taken at the outset of our discussion. An elementary dislike of the Suez Canal and all that attaches to it will be found embedded in the hearts of a vast body of naval officers, who are disposed to minimise the importance of the command of the Mediterranean Sea. They are evidently impressed with traditional beliefs, and shrink from all that seems to withdraw the action of England in war from operations in the open sea. Their minds are restive against the whole conception of "the ditch," and they long for anything and for everything which may tend to restore the trade-route to its old direction round the Cape. If they summarised the practical outcome of their views they would say:—We have the Canal; let us use it in peace time; but should war arise between the British Empire and any strong combination of European powers, we ought to blow up and destroy the Canal, evacuate Egypt, and bestow the whole of our power in maintaining intact the free course of our commerce round the Cape. This school of opinion seems to mentally exaggerate the relative

importance of the Canal, and to think of it as if it was that alone which had created vital interests for us in the Mediterranean Sea.

There is another school of opinion, largely reinforced from Naval sources, which, though it has prominently before it the trade through the Canal, does not look upon the situation in Egypt, and the Canal, with the same strong dislike as the former schôol displays, but yet exaggerates their relative importance. This school of opinion regards the trade-route through the Canal as a hopeless one, at least in the early days of a war with France, because of her strategical position with ports on both sides of the route through the Straits of Gibraltar. It is held that these give her such enormous advantages for the attack of our commerce in the Western waters of the Mediterranean, especially by means of torpedo-boats, that we should be compelled to give up the route in war and to divert the stream round the Cape of Good Hope. Here, again, the argument seems to lack cogency by appearing to insist that the only importance of the Mediterranean to us has been created by the Canal.

Between these schools of thought, which are chiefly occupied in forecasting the practical outcome of the situation should war with France break out, there lies a party, not inconsiderable either in extent or in power of moulding opinion, which seems to hold—for it does not express itself very concisely—the idea of our abandoning all the commercial uses of the Mediterranean in war, and yet of our maintaining the command of the sea from considerations of what is thought to be higher policy. This phase of opinion tacitly but perhaps vaguely admits that the command of the Mediterranean was of great importance to us before the Canal existed, and would still be so were it destroyed, but it does not seem fully to recognise that trade has always followed the flag, and always will follow it. It is scarcely possible in the nature of things that we should hold the military command of the water-route from Gibraltar to Port Said, and yet exclude our merchant ships from its use. Of course it is possible to say that this is but an opinion, but he who puts the view aside as such has against him the whole history of the commercial past, and he must explain it away before he deals with the question from his point of view.

Leaving these schools of forecasting thought on the issues of war and our connection with the Mediterranean, we come to a class of thinkers much more prominent of late, namely, those who, without inquiring whether or not our command of the Mediterranean Sea and the course of our trade in it and through it is or is not a necessity, simply fix their eyes on the actual naval position and naval force of France in the sea; its possible reinforcement by the naval force of

Russia; and the comparison between them and our own momentary position and force. They see in the prospect nothing but danger, and they express themselves as seriously alarmed.

At the bottom of this alarm lies the not altogether modern theory of "the first blow." No one who watches and listens can doubt that the English naval mind of the day, with a great following of the lay mind, is much perturbed by a belief that in some way or other our danger lies, not in any want of steadfastness in a continued war, but in our assumed want of recuperative power after a tremendous and sudden blow which is to be struck at us from some undetermined quarter in the very earliest days of the war, and from the effects of which there will be no recovery. There is only one common feature in these alarms. The blow is always to be tremendous, and it is always to be struck without warning.

The other day it was "the bolt from the blue" by way of the invasion of 100,000 Frenchmen who were to turn up early some morning on the Sussex foreshores at a moment of the profoundest peace; whose march to London was to be absolutely unchecked; whose power to hold forty times their numbers under control in the vast area of houses would be unquestioned; and who would thence give law to an obedient multitude of three hundred and fifty times their number. Then it was some sudden attack on a great public port and arsenal, which, if successful, would paralyse for ever the naval arm of England. Then it was the secret attack on our warships in all their ports by a swarm of the enemy's torpedo-boats on the first dark night after the declaration of war. I do not know if the speculators of this class ever went so far as to consider the influence of the moon on the date of the declaration of any future war, but assuredly if there was much force in their thought, and if the enemy were really likely to deal with us in this kind of way, some attention must be given to the quarterings of the moon before war was declared, as "the first blow" could never be so struck at a season when the moon rose near sunset.

Just now we have rather passed away from the idea that "the first blow" is to be struck on our own shores, and we concentrate our thoughts on an ideal "first blow" which France, more or less assisted by Russia, will strike at our inferior fleet in the Mediterranean. The battle which is to decide the whole issue of European history for ages to come is to be fought inside the Mediterranean—I am not quite sure whether we know the exact spot—not far from Gibraltar, which has grown into sudden and immense importance as the "base" of the fleet which is to sustain this crucial trial. Here, again, the thinkers are less concerned with considering in full and in detail the

permanent as apart from the temporary strategical position, and are more roused to demand as the practical outcome, the maintenance in peace of a superior fleet in the Mediterranean, and an extension of our means of storing and repairing that fleet, commensurate with the extension of its magnitude and its force.

Now, obviously, what is wanted is to bring all these views together, and to discuss them one by one, yet without ever forgetting their various connections or oppositions. In public opinion, the importance of the Mediterranean and our right use of it in war have come wonderfully, and I think rightly, to the front; yet it is clear that public opinion is on the one side only worried, and disposed to be apathetic in order to stifle its worry; while on the other it is alarmed and excited, and ready to adopt anything like movement as a relief.

We must consider the strategical position of the Mediterranean under several aspects if we are to embrace all these views. We have its Imperial, its diplomatic, and its commercial importance, and then we have the geographical conditions which lie at the root of any military strategy to be applied to it; while lastly, we have the existing and possible conditions of the military strategy itself.

Without doubt the Canal has entirely altered the Imperial aspect of the Mediterranean to our view. When it opened to our troopships a newer and a shorter route to Bombay and Kurrachi, it enormously strengthened our hold upon India, and put even great internal risings like the Mutiny almost out of court. But just as it strengthened our position in India, not only internally, but in regard to attacks on its northern land frontiers under the conditions of a free route through the Mediterranean, so did it weaken us in throwing the onus upon us of militarily holding the Canal and the approaches to it. For as long as the Canal exists we cannot go back to our old position. We might, it is true, send our supports and reinforcements round the Cape, with a loss in time of perhaps eighteen or twenty days only, but then if we did not militarily hold some part of the route viâ the Canal we should be leaving the inner line of communication in our enemy's hands in time of war. This is one consideration which makes its destruction so desirable at the opening of war in the eyes of many. But if the Imperial importance of the Mediterranean Sea could be disposed of by some charges of roburite, we might be able to make this a settled policy and go on to the next consideration. Unfortunately for this view there would still remain the Imperial positions of Cyprus and Malta to be considered from the Imperial point of view. Unless we are to react under a different name the tragedy of Minorca in 1782, or its earlier perform-

ance in 1756, with its pathetic and disgraceful epilogue, we must at the outbreak of war frankly abandon those outposts, or hold the Mediterranean with a firm hand.

No one has dared to propose the abandonment of Malta, as no one dared to brave the obloquy of advocating the surrender of Fort St. Philip until its garrisons were mere wrecks and shadows. Is it conceivable that a time could come when we should deliberately quit Malta—confessing in the face of the world the failure of our will or of our power? Are we, on the other hand, prepared to submit its inhabitants and its garrison to the miseries which the garrisons of Gibraltar and Fort St. Philip suffered in 1780, 1781, and 1782, and under which the latter succumbed? The cessation of our complete military hold on the Mediterranean for any time in war would assuredly inflict those miseries, even were no direct attack by land forces made upon Malta. But, again, Malta is more like Minorca than Gibraltar. It is an island easily invaded by sufficient force, and such a force once landed can be easily fed and supported from the sea. Give the enemy time enough—by abandoning to him the waters surrounding Malta—and we have another Minorca in complete form. Given another careless Government and another Byng, and our evacuation of the Mediterranean would make the reproduction of the tragedy in all its parts complete. Cyprus has not, I suppose, the prestige of Malta yet. I conceive that its abandonment as a military necessity might be sufficiently covered with the decent veil of restoration to its Suzerain to pass with little remark. But Malta! No! We should find in times of distress and straits the English mind so obstinately concentrated on that little overcrowded rock that it would lose the whole world to save it.

Thus then the Imperial question of the Mediterranean is not mollified by anything which may be done in Egypt. Malta must be held and its communications must be kept open. It is a bagatelle to hold the Canal if we are compelled to hold Malta. No hypothesist has ever included Gibraltar in the Mediterranean. We are to hold that fortress and depôt whether we cling to, or abandon, the Mediterranean Sea.

We pass to the diplomatic considerations which must determine our way of looking on the Mediterranean in war. Our place in Egypt is not to be considered diplomatically in this connection. We shall be there to keep the Canal open, on recognising that after the maintenance of Malta, this is a small matter. But it is not easy to conceive such a condition of European politics as would enable us to withdraw the support of our fleet from the coasts of those Mediterranean States which are friendly to us; while it is

equally difficult to say we shall not need to watch the naval forces of those Mediterranean States whose attitude is doubtful.

On the contrary, the friendly attitude of such a State as Italy would operate—so long as we occupy the waters in her vicinity—as an immense check on an enemy situated as France would be, while to leave her face to face with her powerful and possibly unfriendly neighbour is a position we should assuredly not take up before we were driven to it. Diplomatically again, our presence in command of Mediterranean waters would probably be a bar to the complete union of the French and Russian fleets. Turkey left to make terms with Russia might naturally open the Bosphorus and the Dardanelles to her, but this could only come about after all chance of seeing a British fleet in the Golden Horn had passed away.

The commercial question of our hold on the Mediterranean in war has of late been a good deal dwelt upon and developed. The only vagueness to be found in the common view is the feeling already alluded to—that its importance has been wholly created by the Canal. The Canal has rather more than doubled the volume of the trade passing through the Straits of Gibraltar, but, apart from the Canal, some £54,500,000 of trade, or about 7½ per cent. of our total trade, comes from and goes to the Mediterranean, but does not enter the Canal. That work brings another stream of £60,000,000 through the Mediterranean waters. The two streams together amount to more than one-seventh of our total trade.

When we have stated the amount of the Mediterranean commerce, and its proportion to our total trade, we have practically left nothing more to be said on the matter. The question then is whether the abandonment of the £54,000,000, and of so much of the £60,000,000 as may be involved in the change of route round the Cape, is to be accepted or not accepted as a consequence of war. For there do not appear to be any half measures available. It does not seem that we can partially abandon our Mediterranean trade so far as it is carried on under the British flag. Experience has told us that if our flag reigns in the Mediterranean there will not be serious check to our trade thither, but that the withdrawal of our flag from those waters will be an absolute bar to any trade whatever under our flag within them. The crucial test of history is the fact—not yet sufficiently noised abroad—that in the year 1797, when Sir John Jervis was forced to retire to Lisbon in consequence of the union of the French and Spanish fleets, not *a single ship under the British flag cleared from any British for any Mediterranean port.* From this we cannot but generalise to the effect that the abandonment by our fleet of its military hold on any waters is a signal to the trade to desert them

also. The thesis is entirely in accord with that which places the holding of water, and of land, territory in the same category, and makes the difference one of degree only.

Such, then, is a general view of all the non-military elements of the Mediterranean problem. Let us now look at its military elements.

First of all, the policy of France in continuing to concentrate the bulk of her naval force at Toulon has seemed to most people to demand an equal concentration of our own force in peace time. Again, the acquirement by France of a port on the African shore, of which she indicates her desire to make a war-port, seems still more clearly to denote an intention of being, if possible, mistress of the Mediterranean.

When we consider these points we are apt to overlook the question of whether the policy the French are pursuing is strategically correct in view of her assumed objects. No doubt, if we are fully persuaded that the policy of "the first blow" is that which is to prove itself master in the next war, it may be that a concentration at Toulon and a harbour of refuge at Biserta are suitable preparations. But we do not know that the idea of "the first blow" is the governing factor, nor can we indeed say as a certainty that the concentration at Toulon and the harbour at Biserta are prepared with the British position alone in view.

In some respects the theory of "the first blow" is traditional, and may be found in all old naval histories in the struggle to be first at sea with a superior fleet when the safe season for putting to sea arrived. This, however, is not quite the modern theory of "the first blow." It resulted in the battle of Beachy Head in 1690, of La Hogue in 1692, and of the Franco-Spanish demonstration off Plymouth in 1779; and in every case the idea was the assembly of a superior fleet able to cope with *all* the forces of the enemy. That is not the modern idea of "the first blow." It is now to be struck by a force which is only locally superior, and its great suddenness and unexpectedness is alone to give it a chance of success. The pattern is more likely to be found in that well-planned ambush which in 1693 lay under Cape St. Vincent, and played such disastrous tricks with our great Mediterranean convoy. Or, later, in the Duc de Richelieu's descent on Minorca which Byng's failure permitted to succeed.

But it is not easy to suppose that with such a network of news collection and distribution as now exists, it would be possible to strike any secret and sudden blow except upon a very small scale. Opinions will differ on the point, and I do not know how to convert

anyone who holds a contrary view; but it is one I cannot escape from myself. I find it difficult, therefore, to suppose that astute French strategists can be looking at the situation in the Mediterranean from that point of view.

I am, on the other hand, disposed to think that unless France has hopes of an open challenge to us at sea, or believes in the theory of "the first blow," her policy in concentrating at Toulon is a false one, supposing her to maintain it on the declaration of war. For we can scarcely avoid noticing that our troubles, our fears, and our expenses have hitherto, in war with France, been greater when her fleets have been divided. When we got the whole of our enemies into one port, as in the case of the Franco-Spanish fleet at Brest in 1800, they ceased to be an anxiety to us. In numbers we were always superior at sea; but when the enemy was distributed with some equality in several ports, we were always in fear of junctions, and in alarm about being placed between two forces, each of which was capable of sustaining alone a combat with our force.

If, therefore, we set up the theory that a war between ourselves and France, or France and allies, would be announced to the world by a Mediterranean Sinope, when apparent friends suddenly discover themselves as enemies and destroy our inferior Mediterranean fleet under that somewhat barbarian cover, then we are logically right in demanding that, however profound the peace, the Mediterranean British Fleet must be at any and at every moment superior to that of France at Toulon and elsewhere in the Mediterranean. But if, on a general review of probabilities, we must regard strained relations and an expectant attitude as a certain prelude to battle of any kind, then it is not so easy to see danger in maintaining a British force in the Mediterranean in peace time which is confessedly inferior to that of France in Toulon. If, indeed, we were to drop our present policy of keeping full reserves, material and personal, at home, and ready at a few days' notice, the danger of an inferior British fleet in the Mediterranean would stand confessed.

But in no case ought we to lose sight of the great mobility of modern naval force. Increase of speed has reduced the area of any theatre of old war to at least one-seventh its old size. Plymouth, strategically within four days of Gibraltar is very different from Plymouth at least twenty-eight days distant. This mobility would prompt sudden changes of disposition of their fleets on the part of our enemies, so as to open the war in a way that we did not expect. Supposing we followed advice which is rather too obvious to be sound, and put ourselves to the expense of keeping up a superior Mediterranean fleet in peace time, and of course adding in con-

sequence to our local establishments, would it not be sound strategy on the part of France to change the theatre of war to the Channel, which a telegram from Paris to Toulon on the eve of the declaration of war would be sufficient to effect?

It would seem that the Admiralty still consider that naval birds in hand are better than naval birds in the bush, and that they feel the safety of the position in the Mediterranean is best assured by maintaining reserves at home, to be distributed only when there is clear knowledge to guide the process. But those who feel alarm because, in a time of profound peace and of friendly relations with France, we are not facing her with equal force, if not with equal docks and arsenals, in the Mediterranean, will certainly put it to us whether we are fairly mindful of the possibility of—under present conditions—our being obliged to evacuate the Mediterranean for a time as the first step in a war.

Our answer is that we think we fully face that contingency. It is not a certain one. It can only be a certain one if it be true that war must come without warning. If there is to be the warning of strained relations, the augmentation of our Mediterranean fleet up to the full measure would be a sure step, and the question of evacuation could not arise. But if we are—as so many believe—to drop into war as we trip over a doorstep, then strategy would probably dictate an immediate withdrawal of the inferior Mediterranean fleet; not to a fallacious shelter under the guns of Gibraltar, but out of the Mediterranean altogether, and up the coast of Portugal, to whatever point it may most speedily form a junction with its reinforcement from England. I am at a loss to see what objection there can be to such a momentary withdrawal. It is one which, as I have said above, is only likely if war should break out with extreme suddenness; but no harm could be done by a Mediterranean enemy in so short a time, and under such certainties of the approach of a superior force, which would seriously cripple us.

Without, I hope, dogmatising more than the nature of the case demands, I have now pretty well set out most of the considerations which bear upon our strategic position in the Mediterranean. I think I show that necessity is laid upon us to make every effort to secure and to keep such a command of the Mediterranean Sea in war as we all admit we must keep of the Channel. We must, it seems, anticipate that, whatever we think about it, our commerce to and through the Mediterranean will continue to flow so long as we profess to command the sea militarily. Government, it appears, will be forced to take all possible steps to keep all Mediterranean roads free to our flag, and will not be forgiven if it fails. If the chief

danger to our commerce is, as Lord Charles Beresford thinks, the torpedo-boat, then we shall have to circumvent it; but the trade which now goes to Mediterranean ports will go there still, as long as it can; while that which now passes through the Canal, rather than round the Cape, for commercial reasons, will not quit its accustomed path until it learns by experience that those reasons are overborne.

I think there is danger in pressing too far the mere point that we find ourselves in peace time inferior in force, and in dock and other accommodation, to the French at Toulon. In every one of these cases the root question is finance. We cannot do all that is demanded in the Mediterranean without a larger expenditure. If we are prepared to undertake it, are we sure the extra sum could not be more effectively used? Is there not danger that if public urgency becomes too great, expenditure which is directly withdrawn from our general strength may go on its gratification? The general strategic position in the Mediterranean cannot be overlooked by any Board of Admiralty. Great power of quick reinforcement from home is surely a safer policy to pursue than a detachment of force which we are not sure will be ultimately required. It is always good to enlighten the public by the discussion of what, as was lately said by the *Times*, "belongs to our peace"; the usefulness of demanding the adoption of particular strategic views by the Admiralty may not be so justifiable.

P. H. Colomb.

CHAPTER VIII.

The Agitation in 1893 for the Increase of the Navy.

To appreciate the movement in this country during the latter half of the past year, which had for an object impressing upon the Government the necessity of considerably adding to our naval strength, as well as to judge whether existing circumstances justified the alarm which was undoubtedly felt in many quarters, it is necessary to briefly review the situation before and since the Naval Defence Act of 1889.

There can be no doubt that for an explanation of these periodical alarms, we must refer not only to the greater interest now taken by the nation generally in all that relates to its maritime position, but they may also in a great measure be attributed to an unwise economy in the past. The British Navy cannot be seriously weakened by occasional reductions, but when these become the normal condition for a considerable period, ground is lost which will take years to recover. Such a period was that between 1870 and 1880, when the average expenditure on the effective service of the Navy did not exceed nine millions sterling. We hear much now of the scarcity of lieutenants with a list of 850 ; but at that time it was proposed to reduce them to 600, and officers were retired wholesale on high pensions. This was only one of a series of measures by which, while our commerce and possessions were increasing, the cost of their protection remained stationary.

Public attention was at last aroused to the great danger of allowing our principal defence to remain in such a weak state, and, as a result, the expenditure on construction rose from three millions in 1880 to five millions in 1885. But this was not enough to make good the remissness of a decade, during which our example had not been followed abroad. Though France, since the war of 1870, had been practically devoting thirty millions annually to the increase of her power on land, the expenditure on her fleet also rose continuously. It had advanced from six millions in 1877 to over eight in 1885. Moreover, other countries were gradually creating fleets of considerable dimensions. At former periods we have had to meet singly powerful combinations at sea, and this might recur. Hence, in 1888 it was felt that a fresh effort must be made. The nation again took the initiative, and the Naval Defence Act was put forward with the Estimates of 1889.

It is probable that in considering our naval requirements the Admiralty were influenced by a very important report of a committee appointed to examine all the circumstances connected with the Naval Manœuvres of 1888. This committee consisted of Admirals Sir Wm. Dowell and Sir R. Vesey Hamilton, and Vice-Admiral Sir Frederick Richards. They reported that "The main lesson which these manœuvres emphasize, is that Great Britain, whose maritime supremacy is her life, is very far from being as strong as she should be on the seas, either in *personnel* or *matériel*." They considered that under the altered conditions which steam and the development of attack by locomotive torpedoes have introduced into naval warfare, it will not be found practicable to maintain an effective blockade of an enemy's squadrons in strongly fortified ports, by keeping the main body of the fleet off the port to be blockaded, without the blockading battleships being in the proportion of at least five to three, to allow a sufficient margin for casualties—to which the enemy's vessels in a secure harbour would not be exposed—and the necessary periodical absence of a portion of the blockading squadron for the purpose of replenishing fuel, making good defects, etc. It was also stated that if a suitable anchorage in the immediate neighbourhood of the blockaded port could be secured, the above proportion might be as four to three, but that a distant base would not answer the purpose. The proposed proportion of cruisers was to be one to every battleship in the blockading fleet, for the maintenance of an efficient inshore squadron.

No more important statement by competent judges of our naval requirements has ever been put before the nation. It clearly defined our policy, and what was needed to carry it out. On such a basis there was no difficulty in ascertaining whether in one respect our Navy was adequate to the work that would be imposed upon it in time of war. Our battleship strength could be fixed. For every three ships which possible enemies, either singly or in combination, could bring into line off their own ports, we must have five to ensure an equal force being always on the spot. A fleet—say—of forty-two ironclads and coast-defence vessels could only be effectively masked by a force of seventy battleships where suitable anchorages in the neighbourhood could not be found.

Whether any single nation but ourselves could put forty-two vessels in line is open to doubt, but there can be no question that the alliance of the two next most powerful maritime states would give collectively such a result. It was recognised that for such a contingency we must be prepared. This was first officially and

publicly promulgated by the First Lord of the Admiralty in submitting the Naval Defence Act of 1889 to Parliament. He then said, "I have endeavoured during the past year to study the speeches of those who in previous years have held my position, and that of Prime Minister, so as to ascertain what was the paramount idea underlying their utterances when they spoke of the standard of strength on which our naval establishment should be maintained. I think I am correct in saying that that idea has been that our establishment should be on such a scale that it should at least be equal to the naval strength of any two other countries." This principle would appear to have been concurred in by both political parties, for Mr. Campbell Bannerman stated not long afterwards, "I accept in fullest and most complete form the doctrine that it is necessary for this country to hold the supremacy of the seas. I accept the doctrine of standard of supremacy that our fleet should equal any other two fleets in the world. That supremacy I believe to be the traditional possession of this country." Judged by such a standard our fleet was then undoubtedly and dangerously weak. As the First Lord pointed out, with one exception the navies of Europe were fifteen or twenty years previously comparatively insignificant, while now there were, not one or two, but four or five nations which were spending largely on their naval armaments. Thus the Naval Defence Act of 1889 provided a timely accession of strength. It has given us, including vessels building at that time, fifteen battleships, fifty-eight cruisers, and twenty-seven torpedo-catchers. All are now practically complete, and both in design and execution bear wonderful testimony to the resources of this country. As the First Lord truly said, "The scheme which I have laid before the House is one which I do not think all the dockyards of Europe would complete in the time we propose." It placed us on a satisfactory footing relatively to what at the time was the normal progress of shipbuilding abroad. Should this not increase materially, our position would be maintained up to the end of 1893.

There was no reason to assume any great advance in foreign construction. We did not suppose that an enlargement of our fleet would excite emulation elsewhere. Lord George Hamilton expressed this view. "Will this scheme," he said, "lead to increased expenditure on the part of foreign nations? I think not. We do not attempt to vie with foreign nations in the magnitude of their land forces. But if, on the other hand, there should be any foreign nation which should wish to encroach upon us, or to invade our naval supremacy, we have framed our scheme so as to bring into world-wide prominence the

incomparable power of this country and its enormous resources." Unfortunately these expectations have not been realised. Whether it is to vie with us or each other, it is clear, as M. Weyl said, in the *Naval Annual* for 1892, that "Each country is labouring with an activity never seen before in a time of peace to increase its naval forces, and to provide them with every improvement." We perhaps are rather too much inclined to consider that such efforts are influenced by the naval activity of this country, but as far as my experience goes the naval policy on the Continent has reference more to what is going on in neighbouring States. French critics of their navy generally compare it with the fleets of the Triple Alliance, and assert its inability to meet such a combination. It is probable also that the newly created sea power of Italy has stimulated French construction. Russia does not build battleships in the Baltic so much with the idea of competing with us as with another country nearer home, which is taking a decided position among maritime states. Thus there is a keen rivalry among them all, leading to continually increasing expenditure on their naval forces, with the result that to maintain the supremacy so essential to the security of this country fresh efforts on our part are now necessary.

This feeling found expression last summer, and continued till the end of the year. It was based on the fact that since 1889 the French naval estimates had increased from eight-and-a-quarter to ten-and-a-quarter millions sterling, while an extensive shipbuilding programme was announced. Russian naval expenditure was now five-and-a-half millions, whereas four years previously it had been maintained at a little over three-and-a-half millions. Russia has created a powerful fleet in the Black Sea, and has recently sent a squadron from the Baltic into the Mediterranean.

Here we were completing the remainder of the ships ordered under the Naval Defence Act. One new battleship, the Renown, had also been commenced, but two others had been postponed, and were not in fact laid down till towards the close of the year as the Majestic and Magnificent. The unfortunate disaster to the Victoria has deprived us of one battleship, and the Navy Estimates for 1893–94 were £100 less than those for 1892–93.

On the other hand, France had under construction ten battleships and coast-defence ironclads, while it had been decided to lay down three first-class battleships in 1894. In addition to this, it had been her policy for some years that as new vessels were completed, the most powerful were sent to Toulon, which thereby became the principal naval port, whereas formerly this distinction belonged to

Brest. The centre of interest, which in the old wars attached to the Atlantic, has now shifted to the Mediterranean, and hence we see at the present time the greater portion of the French fleet in home waters within the Straits of Gibraltar, while our own squadron in that sea has not been proportionately augmented.

There had, moreover, in France been a great development of the torpedo-boat. Originally intended as a weapon of harbour defence, these craft had so increased in dimensions that they had been found capable of service outside the limits of the coast. Some operations in previous naval manœuvres had demonstrated that within a radius of one hundred miles they were capable of striking sudden and effective blows. To facilitate their employment either for such work, or to more effectively guard territory which could not be defended by passive defences, our neighbours have organised torpedo stations mostly up small rivers, where the boats could lie safe from heavier vessels, or to which they could return if pursued. Thus, instead of being concentrated in one spot, they would be distributed previous to the outbreak of war, and so avoid the risk of destruction if the attempt was made to reach these localities after hostilities commenced. Then, again, the continued increase of our commerce caused doubts to arise whether we were making adequate preparation to defend it in view of utterances abroad that it was the weak point in our armour, and against which an enemy's chief exertions would be directed.

These various considerations turned national thought once more to the state of our naval armaments, and it found public expression in the City of London. On July 20th last year Lord Charles Beresford delivered an address to the Chamber of Commerce on "The Protection of the Mercantile Marine during War." As the President of the Chamber, Sir A. K. Rollit, M.P., said, in opening the proceedings: "No one could consider for a moment, without a feeling of dismay, what would happen to this country if its commerce were interrupted, even for the shortest period. To provide for the food of our people, and for our industrial supremacy, we needed not only safety, but the sense of security, and that sense of security could only be given by the perfection of those forces that ensured it." In the course of his paper, Lord Charles advocated that "a definite policy of defence should be made out for the whole Empire—a policy in which the Navy, Army, the Colonies, and the Mercantile Marine should be each one of the links of a chain, instead of as now working independently —a course which causes large and often unnecessary expenditure, and prevents instead of encourages efficiency." He drew a com-

parison between the British and French fleets in battleships and cruisers, showing that, while we had one cruiser or sloop of over nine hundred tons to every seventy-one merchant vessels, France had one cruiser to every thirty ships. He pointed out the danger there would be to our own shipping in the narrow waters of the Channel if we were at war with France, and its exposure in the Mediterranean when passing the hostile portion of North Africa. Hence, he says, why not divert the commerce from the narrow seas into the blue water of the ocean, and so defeat the object for which the torpedo stations were created? By this he meant the Channel should be avoided by merchant vessels keeping to the west of England and round the north of Scotland, while vessels going to the East should take the Cape route. The inadequate resources of Gibraltar were pointed out, and the construction of two moles was advocated, while Lord Charles urged the necessity of having the clauses of the Declaration of Paris clearly defined upon those points which, if used by an enemy to our disadvantage, would be fatal to us. The circulation of this paper led to the appointment of an influential committee of the Chamber to consider the questions raised in it with a view to calling a meeting of commercial men in the City, and so strengthen the hands of the Government in any demands it might put forward for an increase to the Navy. The Chamber also invited the Council of the Royal United Service Institution to delegate representatives of that body to assist the committee, and the Council requested General Lord Chelmsford, Rear-Admiral Cleveland, and myself to act in that capacity.

Several meetings of that committee were held under the presidency of Mr. Jackson, and a memorandum was drawn up on "The State of the Naval Defences of the British Empire in 1893."

The preamble to this report states that, "It is the policy of this country, as admitted by all political parties, that the British Navy should be equal to every duty which it may be called upon to perform in case of war; but there is abundant reason to believe that the Navy, in its present condition, would not be sufficient to fulfil all the duties which it might be reasonably called on to perform in such an emergency." It was felt that such a statement would command more universal assent than if it was declared that our Navy should be equal to any two others combined; but the details which followed clearly showed that with such a standard we were very far from being equal numerically in many respects to two European countries. Moreover, any standard based on numerical equality must be fallacious, because it has been declared over and over again

that if a certain policy is adopted we must, to carry it out successfully, have a decided superiority in numbers. Acting on the facts set before it by this committee, the Chamber of Commerce called a public meeting, which took place at the Cannon Street Hotel on December 12th. The Lord Mayor was to have presided, but, owing to illness, could not attend, and the chair was taken by Sir Albert K. Rollit, M.P., President of the Chamber. The Great Hall was crowded, and an enthusiastic assemblage, comprising all political parties, passed without opposition the following resolutions:—"That this meeting views with deep concern and anxiety the present state of our Navy, and urgently presses upon the Government the necessity of taking immediate steps to provide such additional means of defence as shall afford that security which our Empire and our commerce demand." It was also moved, and carried unanimously, "That this meeting is further convinced that in any financial scheme necessary in the public interests, the Government may be assured of the hearty support of the commercial community."

There being no sign on the part of the Government that it intended to take any special steps to add materially to the fleet, or of giving an assurance of this being in preparation, the question became the subject of an important debate in the House of Commons. On December 19th, Lord George Hamilton moved, "That, in the opinion of this House, it is necessary for the maintenance of the security of this country, and the continued protection of British interests and commerce, that a considerable addition should at once be made to the Navy. This House, therefore, calls upon Her Majesty's Government to make, before the Christmas recess, a statement of their intentions, in order that immediate action may be taken thereon." In the course of an interesting speech, deriving weight from a considerable experience of naval administration, he said, "It is not merely that our fleet, so far as our future wants are concerned, is not strong enough—that is not the reason why I make this resolution—but my reason is, that the danger which threatens the naval supremacy of this country is of so insidious a character that neither the Government nor the House can control or counteract it. Time is the master of the situation at the present moment; and the difficulty with which we have to contend is not the provision of money for the future, but it is the loss of time in the past. When the Naval Defence Act was introduced it was never intended that it should be a mere spurt. The object of that measure was that we should as rapidly as possible get the lead of the navies of any two nations; and it was intended, when we had got that lead, that we should keep and

maintain it. Taking the big ships—and by those alone the command of the sea is decided—France will have six battleships building at the commencement of the next financial year, and three more will be commenced in that year. Russia will have six battleships building, and two will be commenced next year. Together, we get a total of seventeen battleships, while England at that time will have three ships building. How have we got into this position? For two reasons. During the past eighteen months astonishing activity has been developed in the foreign dockyards, and during the same time, as far as the commencement of new ships in this country is concerned, great inactivity has prevailed. During the early part of the financial year I did not realise the great advance which had been made by foreign navies, but I did subsequently warn the Government that expenditure was inevitable, and that it was absolutely necessary, if they wished to keep up the standard of strength, to bring in a supplementary estimate. In the course of the present year I asked the Prime Minister whether he would now adopt the course followed in 1884, but the reply was that there was no analogy between the two cases. Then the right hon. gentleman went on to say, 'I think I may venture to assure the House, on the responsibility of the Government, that neither the House nor the country need entertain, in the existing circumstances, the smallest apprehension as to the maintenance of the distinct naval supremacy of Great Britain.' I have no doubt he was referring to the condition of the Navy at the present moment, without any reference to what it might be as compared with other nations in three years' time. But was it right to make that statement, knowing that within three years the comparative position of the Navy would be altogether changed? The actual expenditure for this year, as regards new construction, is about £1,500,000 less than that of last year; consequently you must have gone back to that extent, and a resolute effort must be put forth to make up for lost time. I feel bound to say that these estimates at once brought before my mind the great advantage of proceeding periodically by Act of Parliament. The system of simply looking at one year can never be satisfactory in a vital concern like the Navy. The only method by which ample preparation can be made is to take a complete and thorough survey of the situation, both of your own navy and of foreign navies, and then to embody the results in an Act of Parliament to which the House gives its assent; and the duty of the Chancellor of the Exchequer is simply to provide the money required by the Act. We have drifted and drifted during the last eighteen months, until we are landed in this position, that I do not

believe, do what we like, we can prevent this country for some period during the next three years passing through a time of insecurity, from the fact that the naval forces of the country will be below the minimum standard fixed as necessary for the security of our interests. I shall hope that the Prime Minister will reply to this resolution in the tone in which it has been proposed, and that he will take this opportunity of making a statement adequate in itself, effective in its procedure, and operative at once to remove the danger to which I have called attention."

Mr. Gladstone then moved the following amendment—"That in the opinion of this House it is a primary duty of the responsible Ministers of the Crown to make adequate provision for the naval defence of the Empire and the protection of its interests, and this House relies on her Majesty's advisers to submit to Parliament fitting proposals in due time and measure to secure that end." After some remarks on the party character of the motion, and his objection to it as tending to transfer the responsibility of the Government to the House of Commons, the Prime Minister said that it was irrational, and even absurd, to maintain that the situation in which we stand to-day is a situation of emergency and danger. We were singularly advanced in all that preparation for future contingencies, which is the most difficult because it requires the longest time. We were far before the strength, not only of any other country, but before the strength of any two countries. Taking the two which had been referred to, it was beyond contention, first of all, that the first-class battleships of Great Britain were at that moment nineteen in number, and, secondly, that the first-class battleships of France and Russia are not nineteen when added together, but fourteen in number. He held, moreover, that in battleships of all classes we had incontestably a numerical majority over the united fleets of France and Russia. It might be that if we did nothing in the Constructive Department for the next five years the condition would be reversed; but had the Government ever said that the future was to have no provision made for it? That was the duty the department was now engaged in considering, on which the Cabinet will have to decide, and on which its judgment would come before the House. He hoped the House would not sanction a motion which, for the first time, aimed at using the instruments and marshalling the forces of political party upon the question of Imperial defence.

Mr. Balfour supported the motion, and defended the course taken by his former colleague in bringing the matter under the consideration of Parliament. He stated that in his comparison the Prime

Minister had omitted the coast-defence vessels of France and Russia, whose size, armour, and armament would enable them to take an effective part in a naval fight in which first-class battleships were engaged. He believed that 1896, not 1897–98, would be the most critical year for this country, for then France and Russia would have thirteen new battleships and coast-defence ironclads. Could we, by 1896, with all our boasted expedition, produce that number? Their contention was not that at the present moment we were inferior to France and Russia, but that we shall be, and that it would be impossible to prevent it unless efforts were made at once.

Sir Charles Dilke said there were persons in the country who had never accepted the test of mere superiority as giving us a sufficient Navy. There was a scientific ground for believing the alarm was pressing, and he held it was present, not prospective. He thought there was as much anxiety out of doors now as there was in 1884, and that it was better founded. In 1884 our Mediterranean and Channel fleets were not outnumbered by the French Mediterranean fleet, as was the case at the present time. Then naval experts had laid it down that for safety there must be a supremacy of five to three in battleships. That was necessary for the purposes of blockade. It was the necessity of the position of this country that our frontier should be at our enemies' ports. If the enemies' fleets were allowed to issue from their ports we should at once lose the advantage of our insular position. As matters stood, there were all the elements of a national catastrophe. As regards allies, looking to the shifting nature of the policy of those Powers which were presented to us as possible allies, it would be most unsafe for any Englishman to count upon help in time of war, except the help of his own strong arm. Last year the cost of the land forces at home and in India was exactly double the expenditure on the Navy. There was some ground for thinking that a distribution of expenditure between the two Services might possibly be arranged which, while enabling us to save upon our land forces at home, might allow an increased outlay on the Navy without adding to the burdens of the country. They must remember that our liberties at home depended upon our fleet, and that the very existence of the Empire was concerned in the question before the House.

Sir A. K. Rollit, as representing the Associated Chambers of Commerce, stated that the feeling of the commercial community was that this question transcended in importance all others. It was too late for our trade to return to the Cape route. He hoped the time would come when we should have a permanent naval council,

including commercial men, who would save the Admiralty from entertaining any ideas of abandoning the Mediterranean and taking to the Cape route.

Mr. Forwood referred to the action of Lord Northbrook in 1884, who said, in bringing forward the subject of the Navy during an autumn session, "I am sure that it is right that the Government should take an opportunity, as Parliament is now sitting, to lay before the two Houses what their view of the subject is, and what proposals they have to make in anticipation of the ordinary estimates of the year." Lord Carnarvon, in the same debate, said, "There had been for about one hundred years a tacit understanding with France by which the naval strength of this country should be at least double that of France." Since the date of the Naval Defence Act, France had laid down ironclads which were to cost seven millions, Russia ironclads which were to cost eight millions, and cruisers which were to cost four millions. The policy of the Admiralty would have been decidedly better had they pushed on the construction of battleships. He thought he was not overstating the case when he said that two out of three ships would have been delayed in construction by fully twelve months. He believed the country relied on its navy being maintained without the possibility of risk in a position of supremacy over the navies of any two foreign Powers, and there was no justification in withholding from the House and the country the information on that subject to which it was entitled.

Sir U. Kay-Shuttleworth said the Prime Minister had promised that adequate measures would be taken for maintaining the relative strength of the Navy as compared with that of foreign countries. As regards postponing the commencement of certain battleships, he would remind the noble lord that in April, 1892, the Board of which he was a member decided to concentrate considerable efforts on the completion of battleships then in progress, and the money for that purpose was to be partly derived from postponing the commencement of two new battleships. It was the wish of the present Government to push on the battleships, so that they should have as effective a fleet as possible, and by April, 1894, they would be ready instead of being on the stocks a longer time. Owing to the terrible disaster to the Victoria, the Admiralty determined to suspend, temporarily, the commencement of the Magnificent and Majestic in order to satisfy themselves upon the point as to whether there was faulty construction in the ships of that class. Having ascertained that it was not owing to her construction that the misfortune happened to the Victoria, the

commencement of the Majestic and Magnificent was proceeded with. Of course the Board were aware that the French had a ten years' programme. They knew what it amounted to in annual expenditure. They knew that the expenditure of Russia had also been increased. The Government were fully alive to it, and the preparation of their estimates, with a view to meeting the requirements of the country, had been for some months—even before all this uproar arose, and not the least in consequence of it—before the Board of Admiralty, which, if not quite complete, was yet in a stage which enabled them to consider how to adjust it to dockyard and other requirements.

Mr. Chamberlain complained that the previous speaker had made a long speech in which he had not touched a single vital point in the whole controversy. He (Mr. Chamberlain) turned to a speech of much greater importance—that of Sir Charles Dilke, who had pointed out to the House in language which was incontrovertible, in arguments which could not be impeached, that the present situation is very unsatisfactory to those who desire to see unquestioned the supremacy of the British Navy. What was the state of the case at present? According to Lord Brassey, Russia has undertaken an annual expenditure of £2,600,000 and France £2,800,000, together £5,400,000 a year, for new construction alone. At the present time our expenditure on new construction is a little over £3,000,000 a year. If these Powers are going to make this increased expenditure above ours without our making a corresponding effort, whatever may be our present position, in a short time the supremacy of the sea will have gone from us, and we shall be unable, except in a lengthened period, which we may not have the opportunity of using, to retrieve the situation.

The Chancellor of the Exchequer, referring to a statement he had made that the supremacy of the British Navy at that moment was absolute, said he had spent several days at the Admiralty examining the question with the First Lord and his naval advisers, who had drawn up for him a paper stating what was the relative position of the British Navy with reference to those of other countries. Hence he was giving the opinions of those whose opinions ought to be respected by the House, and would be respected by the country. He took what had been said by the other side that the supremacy of the sea in home waters, such as the Mediterranean, depended upon first-class battleships. England had in home waters, including the Repulse, Revenge, and Royal Oak, to be completed this year, nineteen first-class battleships, while France had ten. But for

the loss of the Victoria the situation would have been as twenty to ten. Yet in face of that the member for West Birmingham says, "If war broke out to-morrow you would have to cut and run from the Mediterranean." As regards Russia, she has in the Baltic, whence it could be moved to the Mediterranean, one battleship. Therefore the present force of the combined navies of Russia and France, as far as the Channel and the Mediterranean are concerned, is eleven against nineteen British. How could the Russian Black Sea ships come into the Mediterranean? They must break the ban of Europe, for the Russian fleet cannot come through the Bosphorus into the Mediterranean without in the first place, he supposed, capturing Constantinople, and at any rate arraying against itself the Powers of Europe. But if you add the three first-class Russian battleships in the Black Sea, you will have fourteen ships of the combined navies against nineteen British ships. In his opinion that was a satisfactory condition of superiority. Taking ships now in course of construction: in the year 1898 the relative strength of the French and English first-class battleships would be fifteen to twenty-two. At present there was, in his opinion, a perfectly satisfactory supremacy of the British Navy. The question was as to the future. In his belief the more we build ships the more would the other side be led to do the same. A sudden alarm had arisen during the last three or four months. It seemed to him founded upon a complete misapprehension of the existing state of affairs. Their position was that the care of the British fleet had not been neglected. We had at this moment the supremacy the British fleet ought to have, and in the future they were prepared to see that that supremacy was maintained.

Mr. Goschen wished to call attention to the fact that there were other ships besides battleships which would take their place in line of battle. The right hon. gentleman had left out the whole of those powerful coast-defence ships whose armour and whose guns are perfectly strong enough to enable them to tackle a line-of-battle ship. It would not be safe, therefore, to rely upon the list placed before them without examining these second-class battleships and the coast-defence vessels, the neglect of which might plunge us in the very greatest danger.

In a House of 444 members, the resolution was defeated by a majority of thirty-six, and the amendment agreed to.

It will be observed that a great portion of the debate turned on the question of numbers in first-class battleships. Lord George Hamilton had said in his speech that command of the sea can alone

be obtained and maintained by big ships. By this he meant—I take it—that supremacy in the long run must rest with the nation which could place the greatest number of vessels in line of battle, and that cruiser warfare unless so supported could never have any material effect upon the result. Such an assumption does not limit the line to the first class, but includes all battleships considered capable of taking this position. Does anyone with the slightest knowledge of the subject suppose that such vessels as the Requin class, carrying two seventy-five ton guns, and protected with eighteen inches of armour, or the later Jemmapes type, are incapable of coping outside their own ports with ordinary sea-going ironclads? For if they are not equal to such work, for what purpose are they constructed? It can hardly be contended their mission is to keep off cruisers, for their armament is unsuited, their speed inadequate, and their protection exaggerated for this purpose. We must recognise these vessels as factors in estimating battleship strength. Hence, when the Chancellor of the Exchequer based his comparison on numbers of first-class ironclads in home waters, and showed that while we had nineteen, France had only ten, he was ignoring an important element of the case. The House was led to believe that the naval officers at the Admiralty concurred in the opinion he expressed, that the existing condition of things was satisfactory, whereas this was far from the case, for it was credibly reported next day that certain members of the Board had protested strongly against this being stated as their opinion. This led to the Chancellor of the Exchequer making a personal explanation to the House, in which he limited the expression of satisfaction to the special point he had made so much of. As a matter of fact, a few days at the Admiralty will not enable any man not conversant with the subject to make a correct comparison of naval strength, and details should be left to the responsible representative of the department.

There is nothing in this debate to indicate that the Government had determined upon a considerable increase to the Naval Estimates, or that the principal Ministers recognised the necessity of an extensive shipbuilding programme, but there is every reason to believe that a firm stand had been made by Lord Spencer and some of his colleagues in the Cabinet to obtain adequate recognition of our naval requirements. What these may be varies in estimate, but fortunately the cry for more ships and men is not confined to one side. Various programmes have been proposed. The *Daily News*, in an article of January 15th referring to certain figures it had published a month

previously, said, "Our estimate of the ships we want, to place the British Navy on an equality with the combined fleets of possible adversaries, does not differ very widely from the proposals which professional advisers of the Admiralty would at that time have regarded as the minimum compatible with security. Beyond the period thus laid down, continuance of an energetic shipbuilding policy must naturally depend upon what foreign governments may be doing then. Our statement was that eight additional battleships, four of a modified Majestic type and four somewhat similar to the Barfleur, eight first-class cruisers, a certain number of swift torpedo-gunboats, a proportional increase in the flotilla of torpedo-boat destroyers, and some other vessels of a special class, would, if built within the next few years, meet all necessities likely to arise in the meantime. The only way to prevent periodical recurrence of scares, and their costly consequences, is to make it perfectly clear that we intend to safeguard our national existence, and our commerce on which that existence depends, by having a sufficiently strong navy and no more. To do this we must lay down a battleship for every battleship begun by either of the Powers that might act in concert against us, and for every cruiser built by them we must build two. That necessity has been tacitly, if not expressly, acknowledged by all parties in England. The Government is, therefore, taking the best possible course in preparing for a steady yearly increase, whereby our Navy may be kept up to a standard of equality with the combined fleets of any two foreign Powers. This must entail heavy expenditure, but the country will be prepared to bear it when convinced that by no other means can we hope to guard our shores and our trade routes against possible foes." Lord Charles Beresford's suggested programme in March 1893, formulated on the assumption that to make the British fleet equal in fighting strength to its possible enemies it should be numerically superior by at least one-third, taking ships in their order, was as follows :—

Six Royal Sovereigns	£5,376,000
Twelve Barfleurs	7,560,000
Ten Blakes	4,320,000
Ten new-class ironclads	2,600,000
Fifty Havocks	1,800,000
Thirty torpedo-boats	450,000
Gibraltar Moles	634,000
Reserve ammunition and stores	500,000
	£23,240,000

Since that time certain ships have been laid down which are estimated to cost £5,170,000. Deducting this from the original proposal, it leaves a total of £18,070,000 to be expended in completing the programme. As regards the battleships, I have long been an advocate for keeping the displacement within moderate limits. We are building the Renown of a little over 12,000 tons, and I see no reason for going beyond this. There is also great advantage, as Mr. White once said in reference to the Royal Sovereign class, in "a squadron of identical character and qualities, capable of proceeding and manœuvring together." I should prefer to see seven Renowns constructed instead of six Royal Sovereigns, which would provide us with another homogeneous group of eight identical battleships. Lord Charles states that the ten new-class ironclads are for attacking torpedo stations, which, being provided with armour-piercing guns, must be operated against by armour-clad vessels. To the best of my knowledge, however, few of these stations are so provided. They are mostly up small estuaries, where their chief defence is their inaccessibility. They cannot easily be destroyed except by a landing party, and even if more exposed, the draught of an ironclad would prevent her getting sufficiently near them. As regards other items of this programme, we have in course of construction or ordered over forty Havocks, and that seems sufficient for home waters, and acting within a short radius of a base. For more extended service, and as auxiliaries to squadrons, a considerable addition to the torpedo-gunboat class is required. A writer in the *Daily Graphic*, which paper has done much in bringing the needs of the Navy prominently before the public, says of this programme that it "is undoubtedly one which, if carried out, would be insufficient a year or two hence, and would have to be speedily followed by a new one. And ere a new one could be forced upon the Government of the day, we should have to make renewed use of agitation." He advocates a programme which includes the construction of 142 vessels and torpedo-boats at a total coast of nearly twenty-seven millions sterling. He does not see how, without such an expenditure, heavy though it may be, "this country can either maintain her maritime supremacy, or any longer pretend that she cares about maintaining it."

Such briefly is a summary of what has been called the Naval Scare of 1893. It was not produced by any immediate prospect of peace being disturbed, but simply by a feeling that if an effort was not made our naval position would be imperilled. The country became alarmed at the entire absence of ironclads—except the Renown—on the stocks, and with the few ships in contemplation compared with

those in hand for foreign Powers. It was felt that our estimates could not remain at the figures of 1893–94 without endangering the naval supremacy of this country. The Administration should be grateful for such support. In most foreign countries money for the Services is obtained with difficulty from the representatives of the people. Here we have the unique spectacle of the nation urging the Government to spend freely, for it knows that outlay on the Navy not only directly benefits a large section of the community, but also assures a continuance of that prosperity with which our country has been blessed for so long a period. Let our naval policy be guided on the sound lines which have been indicated in the *Daily News*:—

"*We must lay down a battleship for every battleship begun by either of the Powers that might act in concert against us, and for every cruiser built by them we must build two.*"

S. Eardley-Wilmot.

CHAPTER IX.

The Loss of H.M.S. Victoria.

A great naval tragedy.

The loss of H.M.S. Victoria must be regarded as in all its circumstances the greatest naval tragedy of modern times. The flagship of England's most powerful foreign squadron, splendidly found and nobly manned, commanded by an Admiral second to none in capacity and experience, was, in direct consequence of an order given by the Admiral and enforced by him in spite of remonstrance, rammed by the Camperdown, the temporary flagship of the second in command, and sent to the bottom in less than a quarter of an hour, the catastrophe involving, as Rear-Admiral Markham said in his despatch announcing the disaster, "the irreparable loss of the Commander-in-Chief, together with 22 officers and 336 men." The circumstances of this awful tragedy are known in their minutest details through the proceedings of the court-martial which investigated them. Its real cause must, however, remain a mystery until the sea gives up her dead.

Sir George Tryon's evolution.

The Mediterranean Squadron, consisting of thirteen ships, left its anchorage at Beyrout for Tripoli on the Coast of Syria on the morning of June 22. Vice-Admiral Sir George Tryon was in command, his flag flying in the Victoria, the flag of Rear-Admiral Markham, his second in command, being temporarily hoisted in the Camperdown. Shortly after noon the Commander-in-Chief hoisted a signal informing his squadron in what formation and position he proposed to anchor, the squadron being at that time, and for two hours afterwards, in single column line abreast, and its speed a little over eight knots. Two hours later the Commander-in-Chief summoned his flag captain, Captain Maurice Bourke, and Staff-Commander Hawkins-Smith, the navigating officer of the flagship, to his cabin and explained to them the manner in which he proposed to bring the squadron to an anchor. He should, he said, form the fleet in two divisions disposed to port, *the columns being six cables apart,* and then at the proper moment, indicated by bearings and position, he should *invert the lines by turning the columns inward sixteen points,*

finally bringing the fleet up to the anchorage by again altering course eight points to port together.

The danger involved in them.

The critical evolution was here the intermediate one of inverting the lines by turning the columns inward, the columns being at the time only six cables, that is 1200 yards, apart. Its frightful danger needs no demonstration. Probably the Commander-in-Chief was the only man in the fleet who did not perceive this danger the moment the signal for the evolution was hoisted. The turning circle of the Victoria with extreme helm at the speed indicated was known to be just under 600 yards in diameter, that of the Camperdown in similar conditions about the same or, indeed, somewhat more. But with the usual amount of helm used under ordinary circumstances of manœuvring with the fleet—namely 28°, extreme helm being 35°—the turning circle of both ships was not less than 800 yards in diameter. Thus, assuming that the two ships were, as they were ordered to be, just 1200 yards apart, that they turned inward simultaneously at equal speeds, and that either of them turned on any circle greater than 600 yards in diameter, it is geometrically evident that they must collide at the common point in their respective courses where their turning circles would intersect. Nothing could make the proposed evolution even approximately safe unless the two ships could both turn on circles less—and, for security's sake, considerably less—than 600 yards in diameter; and this was impossible save on conditions only to be established by the specific orders of the Admiral given to that intent beforehand. These conditions are that each ship on putting her helm hard over, in the one case to starboard, and in the other to port, should simultaneously have reversed the inner of her twin screws, and gone full speed astern with it until the turn of sixteen points was complete. This would certainly have turned each ship within a circle of sufficiently contracted diameter to leave a safe distance between them at the completion of the turn. But for some reason or another this manipulation of the screws, "jockeying," as it is termed, is discountenanced in the Service. The wisdom and expediency of imposing such a restriction on the inherent manœuvring capabilities of ships provided with twin screws may well be open to dispute. But it seems certain that Sir George Tryon, who adopted no such expedient with his own ship, would not have expected or even allowed any other of his ships thus to "jockey" with her screws unless she had received a specific order, or at least an express permission to that effect beforehand. It was held, moreover, by Captain Johnstone, in command of the Camperdown, that to have reversed his starboard screw at the moment of putting his helm over to port

would, by causing his ship to turn unexpectedly short, have involved her in grave risk of collision with her next astern. But to this contention the Court made some demur.

Representations and remonstrances of his officers.

It is thus manifest that the evolution contemplated by Sir George Tryon was, in ordinary naval parlance, an impossible one; so unsafe, that is, that if implicitly carried out in the manner apparently intended it must result in a collision. This was immediately perceived by the officers to whom it was explained. "It then struck me at once," said Staff-Commander Hawkins-Smith, in his evidence before the court-martial, "that our smallest turning circle being three cables, [and that] eight cables would be the least possible distance it could be done in, and I said, 'It will require at least eight cables for that, sir.' He replied, after a moment's hesitation, 'Yes, it shall be eight cables.'" Nevertheless, Sir George Tryon forthwith instructed the flag-lieutenant to make the signal "Form column of divisions in line ahead, columns disposed abeam to port," and handing him a slip of paper on which he had written the numeral "6," explained that this was his authority for the signal to be made immediately afterwards, "Columns to be six cables apart." These signals were at once made in immediate succession about 2.20 P.M. On seeing the signal flying for six cables, the staff-commander at once remarked to the flag-lieutenant that the Admiral intended the distance to be eight cables and not six, and persisted in this, although he was shown the paper on which the Admiral had written "6." To make certain, the flag-lieutenant went again below and reported the staff-commander's remark to the Admiral. Captain Bourke, who was still in the cabin, also reminded the Admiral that he, the Admiral, had told the staff-commander that he wished the columns to be eight cables apart. To both these representations the Admiral merely replied, "Leave it at six cables;" whereupon the flag-lieutenant returned on deck, hauled the signal down, and sent to inform the staff-commander what the Admiral had said.

Captain Bourke's final remonstrance.

Captain Bourke, however, still remained with the Admiral, and at the court-martial he described what further passed as follows:—"After the flag-lieutenant left I reminded the Commander-in-Chief that our circle was 800 yards. . . . To the best of my belief the Commander-in-Chief said to me, rather shortly, something to the effect of 'That's all right; leave it at six cables,' and then I left the cabin. That was all that passed between us. It was a very short interview. I went on deck almost immediately afterwards."

Could he have done more?

That short interview determined the fate of the Commander-in-Chief himself and 358 other men. No further remonstrance was

made; perhaps no further remonstrance was possible. Naval discipline is very properly strict, and even punctilious. "Sir George Tryon," as Captain Bourke said in his able and touching defence, "had a master mind. He loved argument, but he was a strict disciplinarian. He always used to say he hated people who agreed with him; but that again was different from arguing against a direct order. With this and the fact that I was serving under an Admiral whose experience was far-reaching, and whose vast knowledge of the subject of manœuvre was admitted by all, I seem to have left his cabin not clear in my mind what was to happen, but confident somehow that the Commander-in-Chief must be clear as to his intentions." Nothing further passed until the fatal signal was hoisted, except that Captain Bourke at some time during the interval—more than an hour—said to the staff-commander, "He won't go to more than six cables." Nevertheless, the fact remains that an interval of more than an hour elapsed between the discussion in the Admiral's cabin and the hoisting of the fatal signal. Captain Bourke left the cabin not clear in his mind what was to happen. What was to prevent him putting his own view of the situation on paper, showing that the turning circles of the two leading ships must intersect, and asking the Admiral if that was the manœuvre he, as captain of the ship, was about to be required to execute? The answer must be that the established traditions of the Service, salutary on the whole, but fatal in this particular case, and the immense personal ascendency of Sir George Tryon, forbade him to push his remonstrance to this extreme point. The question lies, and must lie, in a region in which the ultimate sanctions of naval discipline in the concrete are brought into conflict with the ultimate sanctions of human obligation in the abstract. On such an issue the practical judgment, paralysed by the equipoise of considerations not less complex than conflicting, cannot but shrink from pronouncing a decisive verdict. To say that Captain Bourke and his colleagues ought to have done something more to bring their chief to a sense of the awful catastrophe he was preparing, is far more than the circumstances warrant; to regret that they did not see their way to do something more is no personal reflection on them, but merely a general acknowledgment of the tragic impotence of human nature in the face of overmastering fatality.

The fatal signal hoisted.

The signal for the inward turn was hoisted on board the Victoria at 3.29 P.M., Sir George Tryon being on deck at the time and giving the order himself. This was the first intimation received by the other ships in the squadron of the evolution they were required to carry out. The signal was somewhat exceptional in form, being

made simultaneously but separately to each of the two divisions, so that had either portion of it been hauled down independently, the division addressed by that portion of it would have acted independently and at once, while the course of the other division would have remained unaltered so long as the remainder of the signal was kept flying. Moreover, the fact that one portion was hoisted superior to the other, though it was held by the Court to have no special significance, might have induced the belief that the superior portion of the signal would be hauled down before the inferior. As soon as the signal was hoisted it was repeated by the Camperdown, but Admiral Markham directed his flag-lieutenant to keep it "at the dip" as an indication that it was not understood, and proceeded to address an inquiry as to its meaning to the Commander-in-Chief. Before this message could be transmitted the Camperdown's pendants were made by the flag-ship, and a question was addressed to the Rear-Admiral by his Chief: "What are you waiting for?" "It then struck me," said Admiral Markham, in his despatch announcing the disaster, "that he wished me to turn sixteen points as indicated by his signal, and that it was his intention to circle round the second division, leaving them on his port hand. Having the fullest confidence in the great ability of the Commander-in-Chief to manœuvre the squadron without even the risk of a collision, I ordered the signal to be hoisted, as an indication that it was understood." At the same time the Rear-Admiral directed a reply to be made to the Commander-in-Chief's question: "Did not quite understand your signal." This reply was never received on board the flag-ship, or if received was never reported to the Commander-in-Chief.

Proceedings of the Rear-Admiral.

Comments thereupon.

Two errors of judgment—venial no doubt in the abstract, but fatal in the concrete circumstances—would seem to have been here committed by the Rear-Admiral. He practically treated the Commander-in-Chief's question as a peremptory order to execute the signal without further inquiry, remonstrance or delay; and having interpreted the signal in a manner not obviously nor, according to the Admiralty minute, legitimately indicated by its terms, he proceeded to execute it without further hesitation. His action was quite intelligible, and even theoretically defensible, on the ground clearly indicated by a question repeatedly addressed on his behalf to witnesses before the court-martial:—"If a junior flag officer, or a captain, interprets an order from his senior as capable of being carried out safely, is it not his duty to obey that order without further question?" But its consequences were disastrous nevertheless. He could not of course know what had passed on board the flag-ship. He could not be

expected to assume, or even to believe, that one of the most capable and experienced of living admirals had deliberately contemplated and ordered an evolution impossible on the face of it, still less that he had done so after repeated representation and remonstrance, and after having, in the first instance, acknowledged its danger himself. He was bound, on the contrary, to assume that the Commander-in-Chief knew what he was about. But in so critical an emergency he was surely bound also to ascertain exactly what he was about himself. The Commander-in-Chief's question gave him an opportunity of doing so. A question, however peremptory and impatient in its terms, is not an order; and it is no disobedience of an order to delay executing it until a question relating to the delay has been answered in such a manner as to disclose the original cause of hesitation. An explicit answer to the Commander-in-Chief's question, or a respectful inquiry as to the exact meaning of the signal, might only have delayed the evolution for a few minutes, but in all probability it would have prevented a ghastly catastrophe and saved hundreds of lives. On this point the finding of the court-martial, which has since been endorsed by the Admiralty, merely expresses another of those tragic antinomies with which this melancholy story abounds: "The Court strongly feels that although it is much to be regretted that Rear-Admiral Markham did not carry out his first intention of semaphoring to the Commander-in-Chief his doubt as to the signal, it would be fatal to the best interests of the Service to say he was to blame for carrying out the directions of his Commander-in-Chief present in person."

The collision.

We have now reached the point at which a disaster became inevitable. The fatal signal was hauled down as soon as Admiral Markham had answered it, and the Victoria's helm was put hard over to starboard at an angle of 35°, the Camperdown's helm being simultaneously put over to port at an angle of 28°. The ships began to turn towards each other, and when they had turned through eight points a collision was manifestly imminent. The inner screw of each ship was then ordered to be reversed at full speed, Captain Bourke having twice or thrice appealed to Sir George Tryon before obtaining permission to give the order, and orders to close the watertight doors were given at the same time, though, unhappily, too late. Immediately afterwards full speed astern was ordered to the remaining engines in both ships. The ships rapidly closed, however, and while they were still moving ahead at a speed of some five or six knots the Camperdown's stem crashed into the forward part of the Victoria, driving her over some 60 or 70 feet to port, penetrating some five or six

feet through the upper deck, and further still below the water-line and making a breach some 12 feet in width and 28 feet in vertical height. For a minute or more the ships remained locked together, their sterns swinging towards each other. At last the Camperdown backed out, and the Victoria at once began to sink by the head, heeling at the same time rapidly over to starboard. The Victoria's crew were forthwith mustered on deck, where they assembled in perfect order, though, unhappily, many were still detained by their duties below; and Sir George Tryon, not anticipating an immediate disaster, ordered a course to be shaped for the shore, and countermanded the lowering of the boats which the other ships in the fleet were instantly preparing to send to his assistance. But owing to the gradual spread of water through doors and hatches left open or only imperfectly closed, the heel to starboard rapidly increased up to about 20°, and as this inclination was reached, some nine or ten minutes after the collision, the stricken ship suddenly gave a lurch to starboard, and, turning bottom upwards, disappeared beneath the waves, sinking by the head while her screws were still revolving in the air. Every man on board of her went down with the ship. Of those who struggled to the surface through the seething turmoil of waters many were injured by the floating wreckage, and perished before they could be rescued. The more fortunate survivors were picked up by the boats of the squadron. Sir George Tryon himself was never seen again. He retained his composure to the last, calmly issuing his orders for the salvage of his ship and the due order of his squadron, telling a midshipman to save himself, and generously acknowledging to the staff-commander, "It is entirely my doing, entirely my fault."

The action of the Camperdown, and the comments of the Admiralty thereon.

The causes and circumstances which led to the collision have already been examined. It remains to consider those which led with such awful suddenness to the foundering of the ship. Two subsidiary points may however first be mentioned. It will be observed that the helm of the Camperdown was not put hard a starboard, but only to the ordinary manœuvring angle of 28°. Moreover, when the order was given in the Camperdown to go full speed astern, first with the starboard engine and afterwards with both engines, the actual speed given to both engines as they were reversed was, through some fault in the indicators, only three-quarters speed. On these circumstances the Admiralty commented as follows in the Minute in which they reviewed the finding of the court-martial:—

"They deem it necessary to point out that the Rear-Admiral's belief that the Commander-in-Chief would circle round him was not justified by the proper interpretation of the signal.

"The evidence shows that it was owing to this misconception that the precautions, which mistrust of the order given by the Commander-in-Chief should have prompted, were not at once taken by the Rear-Admiral, and that he did not order Captain Johnstone to reverse the starboard screw and to close the watertight doors, until after the ships had turned eight points inwards and were end on.

"The Rear-Admiral has taken all responsibility upon himself for the conduct of the Camperdown on this occasion, but their Lordships are unable to accept this as entirely relieving Captain Johnstone of the distinct and separate responsibility which devolved upon him as captain of that ship.

"Captain Johnstone had the same mistrust of the signal as Rear-Admiral Markham, and shared his belief that the Commander-in-Chief intended to circle round the Second Division.

"To this may be attributed the fact that he did not make immediate preparations for the avoidance of collision and the safety of his own ship, by either ordering the starboard screw to be reversed or suggesting this course to the Rear-Admiral, and by directing watertight doors to be closed immediately the signal was hauled down.

"But it appears that when the Rear-Admiral ordered all preparations to be made for a collision, Captain Johnstone did not even order extreme helm to be used, as was done from the first in the Victoria, nor did he carry out the orders which he had received with due rapidity and efficiency.

"While their Lordships do not consider Captain Johnstone to blame for the mistake in not going full speed astern, when the order to reverse the engines was given, they feel bound to express their regret that he did not manifest the promptitude and decision which the occasion demanded for the security of the ship under his command, and to diminish the risk of collision."

The cases of Captain Bourke and Captain Johnstone compared.

The difference between the judgment here passed on Captain Johnstone and that passed on Captain Bourke, to whom no blame was imputed either by the court-martial or by the Admiralty, has, not unnaturally, provoked some comment and criticism. But the difference between the circumstances of the two cases is nevertheless sufficiently obvious. "When," says the Minute, "the Rear-Admiral ordered all preparations to be made for a collision, Captain Johnstone did not even order extreme helm to be used, as was done from the first in the Victoria"—although Captain Bourke had received no orders from the Commander-in-Chief to make all preparations for a collision, and although, as is quite plain, no fear of a collision was ever entertained by Sir George Tryon. The closing of the watertight

doors was nearly simultaneous in both ships, and too late in each case; but here again the circumstances, so far as they affected the responsibility of the respective captains, were not exactly parallel. On this point there is perhaps nothing to add to the judgment pronounced by the *Times* when the Minute was first published. "Captain Johnstone was free to act as his judgment dictated. There was no difference of opinion between himself and Admiral Markham as there had been between Captain Bourke and Sir George Tryon. If after remonstrating with his chief and being silenced Captain Bourke had, on his own initiative and in the Admiral's presence, ordered the watertight doors of the Victoria to be closed as the signal was hauled down, it may well be held that his action would have amounted to a virtual censure on his chief, and almost to a breach of naval discipline. It is possible to regret that he did not take that grave and very unusual responsibility, that he did not realise that, as was said at the time of the court-martial, 'cases will now and then arise in which the best servant of the country is he who can dare, without previous authority or justification, to disobey.' But such a case is, perhaps, hardly one for direct official censure."

Causes of the foundering of Victoria, and means taken by Admiralty to ascertain them.

We now come to the causes which led to the sudden foundering of the Victoria. The court-martial concluded its finding as follows:— "The Court has placed in the Minutes all evidence obtainable with regard to the closing or otherwise of the watertight doors of H.M.S. Victoria, but it does not feel itself called upon, nor does it feel itself competent, to express an opinion as to the causes of the capsizing of the Victoria." This finding naturally placed the Admiralty in a position of some difficulty. It amounted to a deliberate refusal and an explicit confession of incompetence on the part of a responsible body of experienced executive officers to pronounce on the technical and constructive issues involved in the evidence laid before them. As the public interest imperatively demanded that these issues should be exhaustively threshed out and authoritatively decided, only two alternatives seem to be open. Either the Admiralty might refer the whole matter to an independent tribunal of inquiry, or they might order an investigation in their own Constructive Department, and finally review the conclusions there established on their own paramount authority. Neither course was free from objection. The former would paralyse the Constructive Department so long as the inquiry was in progress, and might weaken its initiative for a long time to come. The latter would certainly wear the appearance of setting the Constructive Department to review its own handiwork, even though no personal responsibility was involved, and might

à priori be expected to result, as it actually did, in throwing the blame, not on the construction of the ship, but on the executive officers in charge of her. However, the Admiralty chose the latter course, and the result is officially set forth in the following extract from the Minute issued in consequence :—

"Their Lordships instructed the Director of Naval Construction to make a thorough examination and analysis of those parts of the evidence which throw light on these points" (that is, on the closing or otherwise of the watertight doors, and the causes of the capsizing of the ship). "The Report which he accordingly prepared has been carefully considered by their Lordships with the evidence on which it is based. They find that this evidence is ample, notwithstanding the fact that many officers and men who would have been valuable witnesses were unhappily lost in the disaster.

"Their Lordships have thus been able to complete a full investigation into the causes of the sinking of the Victoria, and to arrive at the definite conclusions hereinafter set forth.

"The evidence establishes the following facts :—

"(*a*) That after the collision the forepart of the Victoria gradually sank, and the ship simultaneously heeled to starboard, and that after this had been going on a short time, a lurch occurred, which resulted in the capsizing of the ship.

"(*b*) That up to a very short time (about one minute) before the collision took place, a large number of watertight doors, hatches, and ports were open, and that, owing to the inrush of water, many of these, situated in the forward part of the ship, could not afterwards be closed. Many compartments must therefore have been flooded in addition to those which were actually breached by the collision.

"(*c*) That the sea rushing into these compartments gradually depressed the bow of the ship from its normal position (about 10 feet above water) to 13 feet below water, or a total depression of about 23 feet, while the stern rose about 6 to 7 feet. Thus the forward half of the vessel was almost completely submerged. This extreme change of trim produced a great diminution of her stability.

"(*d*) During the same time, the heel to starboard (the wounded side) very slowly increased, until a transverse inclination of 18 to 20 degrees was attained before the lurch began.

"This comparatively slow but continuous change of position can only have been caused by the gradual flooding of compartments adjacent to, or in communication with, the compartments breached by the collision.

"There are many compartments forward respecting which the

evidence does not clearly show whether or not they were closed before the collision. But if only those which the testimony of witnesses shows to have been certainly flooded are taken into account, the result is a loss of buoyancy, sufficient to produce the change of trim and angle of heel observed before the lurch began.

"The great weight of water thus gradually admitted into the forward part of the ship might eventually have caused the ship to founder by the head. The reason why she capsized before foundering has now to be explained.

"The armour door on the starboard side at the forward end of the battery, the 6-inch gun ports of that battery, and the turret ports were open at the time of the collision, and were not subsequently closed. Observers on other ships noted that the water had reached such a height as to permit its entry through the open turret ports and armour door; also that the ports at the forward end of the battery on the starboard side were awash at the moment when the lurch commenced.

"The consequent inrush of water into the battery, accompanied by the descent of large quantities of water from the upper deck within the battery through open hatchways into the lower portions of the ship, and the inflow of water through the turret ports, necessarily had the effect of suddenly destroying the ship's stability, already very seriously reduced by the submergence of the bow, and of making her capsize.

"The capsizing of the Victoria under the special circumstances above described does not suggest any insufficiency of stability in the design of that vessel. The provision made was ample for all requirements. When fully laden and in seagoing trim the metacentric height was five feet, stability reached its maximum at an angle of 34½ degrees to the vertical, and the range of stability was 67½ degrees.

"The question remains, what would probably have happened if all doors, hatches, etc., had been closed in the Victoria before the collision took place. Investigation shows that while the loss of buoyancy must in that case have been considerable, yet, making all due allowance for probable damage, the ship would have remained afloat, and under control, and able to make port under her own steam. Her bow would have been depressed about to the water level; her heel to starboard would have been about one-half of that observed before the lurch began; her battery ports would have been several feet above water, and she would have retained ample stability.

"The detailed evidence establishes the fact that watertight doors, hatches, etc., in the Victoria were in good order. It contains nothing

which suggests a doubt of the efficiency of the system of watertight sub-division existing in the Victoria. At the parts affected by the collision the sub-division was minute, but doors were left open. According to the established practice of the Admiralty in all classes of ships, the number of watertight doors is made as small as possible consistently with the essential conditions for working and fighting the ship.

"The evidence clearly shows that the existence of longitudinal watertight bulkheads in the Victoria was not the cause of her capsizing. There were only a few minor longitudinal partitions in the forepart of the ship. Many of these were inoperative because of damage or open doors.

"It also proves that the loss of the ship was not due to injuries sustained above the protective deck. Those injuries produced a loss of buoyancy forward which was unimportant compared with that resulting from the flooding of compartments below the protective deck.

"The fact that the Victoria was not armour-belted to the bow had no influence upon the final result of the collision. No armour-belt could have prevented the ripping open of the bottom below water by the ram-bow of the Camperdown, and the flooding of the compartments to which water could find access through the breach.

"In conclusion, their Lordships are of opinion that the general structural arrangements of the Victoria (similar in many respects to those of other ships in her Majesty's Navy), with the arrangements of watertight doors, armoured belt, and protective deck, did not by any fault of principle contribute to the loss of the ship; but that, on the contrary, had the watertight doors, hatches, and ports been closed, the ship would have been saved, notwithstanding the crushing blow which she received from the Camperdown."

Conclusions established by the Minute of the Admiralty.

If the reasonings and calculations on which this Minute is based be accepted, they would seem to establish the following conclusions:—

1. That the ship would not have foundered if all doors, hatches, etc., had been closed before the collision took place.

2. That even in spite of the damage actually effected by the collision and the loss of buoyancy, stability, and trim, due to the doors, hatches, etc., known to have been left open, the ship might still possibly have been saved, and her sinking would in any case have been far more gradual if all openings on the upper deck had been closed, and the water thereby excluded from the turret and battery.

3. That the capsizing of the ship was not due to the existence of longitudinal watertight bulkheads, to injuries sustained above the protective deck, or to the absence of a continuous armoured belt.

Remarks thereupon.

It may be taken as a fact beyond serious dispute that the closing of all doors, hatches, etc., before the collision would have saved the ship; and this being so, the question whether her actual loss was due to openings unclosed below or to openings unclosed on deck becomes mainly a speculative one. The thing is to close the openings below and thereby to eliminate the possible residual effect of openings unclosed on deck contributing in their turn to the final extinction of stability. But the demonstration that the watertight doors were in good order, that if closed betimes their closing would have saved the ship, and that there were not more of them than were required by the conditions essential for fighting and working the ship, merely proves, after all, that the ship was judiciously designed from a constructor's point of view. "Your ship shall not sink if you do as I tell you," says the constructor. "But I cannot work and fight the ship if I do as you tell me," replies the executive officer; and here the antinomy seems to be complete. The doors are obviously meant to be sometimes open or they would not be there at all. What security is there that the conditions essential for working and fighting the ship may not require them to be open at the moment when a collision becomes imminent either through accident in time of peace or through the attack of an enemy in time of war? If the doors are not wanted they ought not to be there. If they are wanted, they are certain sometimes to be open when an emergency arises. And if open when an emergency arises, they ought to be capable of being effectually closed within less than a minute, as the experience of the Victoria shows. This latter requirement is obviously essential even from the point of view taken up by the Admiralty. The Admiralty virtually affirm that the ship was lost because the doors were not closed. The order to close them was given about a minute before the collision. If this order was given too late, then Captain Bourke was surely to blame for not giving it earlier. But the court-martial found that no blame was attributable to Captain Bourke, and the Admiralty confirmed the finding. Surely then the failure to close the doors within the few seconds allowed by the emergency, if authoritatively declared to be not due to any lack of executive promptitude and decision, must be regarded as due either to a grave fault of construction, or to a more or less imperfect co-ordination of constructive conditions on the one hand with the conditions essential to the working and fighting of the ship on the other. What the constructor really says to the executive officers is, then, "Your ship shall not go to the bottom if your watertight doors are closed in time; they are there to

satisfy the conditions essential for working and fighting the ship, and must therefore occasionally be found open when a sudden emergency arises; you may only have a few seconds to close them in; and if that proves insufficient and any of your deck openings also remain unclosed, you may expect to go to the bottom in less than as many minutes." On this the only comment of the Admiralty is that "regulations will be issued to the fleet which, while maintaining the responsibility and discretionary powers of commanding officers, will insure that under special circumstances, and particularly when there is risk of collision, doors, hatches, etc., shall be kept closed as far as possible, and men stationed at any that are necessarily left open. These regulations will also direct that, under certain conditions arising out of collision or under water attack, the gun-ports and other openings in the upper structure shall be closed before water can enter and endanger the stability of the ship." This is perhaps all that can be done in the circumstances; but perhaps few will consider the construction of a ship to be entirely satisfactory so long as it is officially admitted that the unemployed lapse of a few distracted seconds may make all the difference between comparative safety and instant destruction.

Sir George Tryon's error the real cause of the disaster.

The other questions raised by the Admiralty Minute are at once more technical and more speculative, and may for that reason be left to be threshed out by professional discussion. The advantages of a continuous armoured belt are unquestionable, but they cannot be secured without a further compromise with other elements of battleship efficiency, and though Mr. White's conclusions on this and other associated points have been disputed on high authority, it seems certain that the issue raised, though of great moment in itself, is not a leading one in the particular case under examination. The real cause of the disaster was, after all, the fatal, and still unexplained, darkening of Sir George Tryon's mind during the hours which preceded the catastrophe. *Humanum est errare* is the trite but tragic comment which alone befits the case. His error is inexplicable on any theory consistent with the full possession and control of his rare mental powers. But charity, at least, owes to his memory the apology which, in the case of any other man, he would certainly have been the first to offer; for in talking to the present writer about the loss of the Serpent, he once made the remark, as ominous of his own fate as it was characteristic of his generosity, "An error of judgment, I fear; but we are all liable to it, and those poor fellows have paid for it with their lives."

Heroic conduct of the Victoria's crew.

It only remains to pay a tribute to the memory of those who died with him. Their conduct, and that of the survivors too, who were

only more fortunate, and not less heroic than the lost, is the one consoling feature in all this melancholy tragedy. "The opinion expressed by the Court," says the Minute of the Admiralty, "as to the order and discipline maintained on board the Victoria up to the moment of her sinking, is fully shared by their Lordships. It was in the highest degree honourable to all concerned, and will ever remain a noble example to the Service." For those who were lost there can be no more fitting epitaph than this; while for those who were saved, for the Navy and the nation at large, the simple words of Captain Bourke deserve to be held in everlasting remembrance, as a motto not less inspiring than Nelson's immortal signal: "The conduct and steadiness of all in their stations was beyond praise, and there was no panic of any sort or description."

JAMES R. THURSFIELD.

CHAPTER X.

Moderate Dimensions—An Argument from History.

For illustrations of the great principles of naval strategy we naturally turn to the history of the wars of the French Revolution and Empire, so admirably told for us in the pages of Captain Mahan. The principles of naval strategy do not change; our policy of Imperial defence should be guided to-day by the same principles, the value of which was so clearly demonstrated in the long struggle which culminated in the battle of Trafalgar. It is possible that we should look in the same direction for guidance in the principles which should govern the ship-building policy of to-day. The type of ship may have changed. The wooden three-decker has given way to the iron or steel clad turret-ship, the frigate has given way to the protected cruiser, but the navy of to-day may still be divided into the main classes into which it was divided in 1815, and the functions of the respective classes are about as clearly distinguished to-day as they were ninety years ago. The constructive problems may be different, but we may none the less be justified in believing that the main principles which should govern the ship-building policy of the country remain the same.* The controversy still rages round the question of dimensions. The compiler of the *Naval Annual* has always maintained that there should be a reasonable limitation in the dimensions of battleships, and that it is better policy to distribute the sums placed at the disposal of the constructive branch of the Admiralty amongst a larger number of ships of moderate size, than amongst a smaller number of ships of the enormous dimensions now in vogue in the British Navy and recently abandoned by the Italians. The lessons to be drawn from history have not, so far as the compiler is aware, been as yet set forth in detail, and in view of the importance of the subject it seems that an attempt to do so will not be out of place here.

Lessons from the Great War.

* It may be said that the introduction of armour and the fact that the larger ship carries armour which is impenetrable to the guns of the smaller to some extent neutralize the grounds of this belief. The impenetrable armour of a modern battleship covers so small an area of the ship's side as to make it most unlikely that it will be hit, while in the days of wooden ships there was also a great difference between the resisting power of the scantlings of a frigate and a line-of-battle ship.

Before entering into a detailed examination of the actions fought in the Great War, it is necessary to state that the advocates of moderate dimensions do not argue that the smaller ship is superior or even equal to the larger—ship for ship. They admit that a two-decker is inferior in force to a three-decker, and a Centurion to a Royal Sovereign. Still more readily do they admit that ships of an inferior class are unable to match themselves against ships of a superior class, even with the advantage of numbers on their side; that cruisers, for instance, are unable to cope with battleships, or frigates with ships of the line. Their contention is that the experience of history shows that numbers are of greater value than size in determining the issues of a naval action or the results of a naval war. They are well aware that their argument has its limitations, and that by indefinitely reducing dimensions it can be reduced to an absurdity. It should always be borne in mind that the battleships of to-day, like the ships of the line in the old days, are intended to act in concert, in fleets. If they were intended to act singly, the argument in favour of moderate dimensions for battleships would naturally lose much of its force.

The actions of the Great War may be divided roughly into (1) general or fleet actions, and (2) single-ship actions, which may be either duels between two ships or engagements between a single ship on the one side and two or more on the other. An examination of these actions will show that, even in duels between ships of the same class, there is no ground for the belief that superior size necessarily ensures success. The actions in which the smaller ship succeeded are as numerous as those in which success rested with the larger. In general actions, with which it is proposed to deal in the first instance, it is clear, beyond a doubt, that superiority of size is of little value against superiority of numbers, the "tactical" classes of the combatants being similar. No decisive victory has ever been won in a fleet action unless a larger number of ships on the one side has been concentrated on a smaller number of the other. It was the main principle of the tactics of Nelson, St. Vincent, and other great admirals of their time, to concentrate the whole of their force on a portion of the enemy's line, and to overwhelm it by numbers before the remainder could come to its assistance. Their victories were certainly not won because they possessed the larger and more powerful ships, as will be apparent from the list of ships given with each action discussed below. Individual size and power was naturally not without influence. It prolonged the resistance of a ship in certain instances, but it does not seem to have been taken seriously into consideration by the admirals of the day, with the exception of Lord

Howe on the 1st of June. Lord Howe endeavoured to arrange his line, as he was bearing down on Villaret's fleet, so that his own largest ships should be opposed to the largest ships of the enemy. He did not altogether succeed, and in subsequent naval actions it does not appear that any attempt of the kind was made. There is little evidence of any hesitation on the part of the 74-gun ship in the naval actions of the war in attacking a three-decker. The ship of moderate dimensions, the 74-gun ship, was found by experience to be the best adapted for general service. She was fit to "lie in the line," whereas the 64-gun and 50-gun ship were found to be too small, though they did take part in certain general actions. The 64-gun ship may have been considered a line-of-battle ship as long as she existed, but the fact that she disappeared from the Navy list bears out what has just been said. The argument in favour of reducing dimensions here clearly has its limitations. Ships of moderate and *not* small dimensions were found to be the most effective.

We will now proceed to analyse the general actions in detail, dealing only with the incidents in each which bear on the subject under examination.

General Actions.

The partial engagement which took place between Lord Howe's fleet and the French fleet, under Admiral Villaret Joyeuse, is of much importance as bearing on the subject under discussion, for the following reason. Captain Mahan, whose ability as a writer on naval subjects is unquestioned, says:—"The Révolutionnaire (110 guns)"—which on the approach of the flying squadron of the British fleet had taken the rearmost station in the French line, and on whom the brunt of the engagement fell—"was nobly fought, and the concentration upon her, though eminently judicious, served to bring out vividly the advantage, which should never be forgotten, of one heavy ship over several smaller, though the force of the latter may, in the aggregate, be much superior. The attacks this day made upon her were from the nature of the case not simultaneous." Captain Mahan's inference is here disputed. It appears that, though the size and force of the Révolutionnaire may have prolonged her resistance, what happened on the 28th of May is very far from being a telling argument in favour of individual size and power. The Bellerophon (74) first engaged the Révolutionnaire for an hour and a quarter, James says, "unsupported," though for the latter part of the time three other British 74's had opened a distant fire from to leeward on the Révolutionnaire (who was unable to make use of her lower deck

28th May, 1794.

guns to reply to them*) as well as her next ahead. These British ships did not suffer from the fire of the Révolutionnaire; it is improbable that their fire had much effect on her. "The latter," says James, "having lost her mizzenmast, and being otherwise much disabled by the well-directed fire of the Bellerophon, bore up." The Bellerophon was at the same time disabled by a shot upsetting her main cap, but that she had had the best of the contest is clear from the fact that she had not lost a single man. The Leviathan (74) engaged the Révolutionnaire till the coming up of the Audacious, and then passed on to attack the ship next ahead, also without the loss of a man. The Audacious, assisted perhaps for a time by the Russel, who was some distance to leeward, although Captain Mahan says she was alone, continued to engage the Révolutionnaire till 10 P.M., when by two independent authorities the latter is said to have struck. She was not captured owing partly to the disabled state of the Audacious; but still more to Lord Howe's recalling his ships to form his line for the night. Troude says, "Accablé par le nombre le Révolutionnaire allait probablement succomber." She was clearly a beaten ship, her loss amounted to at least 150 men (James, quoting from French accounts, says 400), while the Audacious lost 3 killed and 19 wounded. The net result of the action was that the French lost a 110-gun ship and the British a 74. Both ships reached port in safety.

To sum up the results of this action, as far as they affect our argument:—A 110-gun ship was beaten by the successive attacks of three 74's, one of which was in a position to, and did, continue the action with other vessels, the second of which but for being temporarily disabled in her sail power by a single lucky shot would have done the same, and the third of which suffered a loss quite insignificant compared with that inflicted on her opponent. It is impossible to believe, for the reasons given above, that the three 74's which fired at the Révolutionnaire from to leeward had any serious influence on the result. They certainly took no part in the final stages of the engagement. It may be of interest to quote a passage from a letter written on April 8th, 1893, only a few days before his death, by Admiral Long, whose loss to the service was so generally deplored. It was the last of a long correspondence which passed between the writer and himself with regard to the passage in Captain Mahan, above quoted. Admiral Long, though he still remained an advocate of large dimensions, wrote: "I have been thinking over your last letter, and trying to get some new facts, without success.

* Troude.

On the whole, it seems to me Mahan's conclusion requires other reasons than those afforded by this incident."

The action which took place on 29th May is of importance to our subject, as showing that such success as Lord Howe was able to obtain, which would have been more complete but for Villaret's skilful manœuvre, was obtained by bringing a large number of his own ships to bear upon a smaller number of the enemy's. Though no French ships were captured, two were disabled, one of which, the Indomptable (80), had to be detached from the fleet in charge of a 74, while the Tyrannicide had to be taken in tow by a consort and was towed by her in the action of 1st June. 29th May, 1794.

The forces engaged were:— 1st June.

British (25 Ships).	French (26 Ships).
3 100-gun ships	1 120-gun ships.
4 98 " "	2 110 " "
2 80 " "	4 80 " "
16 74 " "	19 74 " "

The intention of Lord Howe in this battle was to attack the French line, ship for ship, and the engagement was in the first instance general all along the line. But, owing to the fact that seven of the twelve ships ahead of the French Admiral ran out of action to leeward soon after the battle began, and that six out of the thirteen ships astern of him deserted their posts sooner or later, the victory was really won by superiority of numbers, against which individual size and power were of little avail. Though they were not actually captured, the three largest French ships were amongst those that suffered the most. The Montagne (120) lost 300 men, the Républicain (110) and Terrible (110) were dismasted and should have been taken. Six ships, viz., two 80's and four 74's, were captured, and one 74, the Vengeur, sunk. The Invincible (74) engaged the Juste (80), a ship far superior to her in force, and compelled her to bear up. The Juste was one of the 80-gun ships captured.

The forces engaged were :— St. Vincent, 1797.

British (15 Ships).	Spanish (27 Ships).
2 100-gun ships	1 130-gun ship.
3 98 " "	6 112 " "
1 90 " "	2 80 " "
8 74 " "	18 74 " "
1 64 " "	

The Spanish fleet was formed in two divisions at some distance apart, the weather division consisting at first of nineteen, and the lee division of six ships. Three ships of the weather subsequently joined the lee division, and one of the latter fled, so that the

respective numbers became nineteen and eight. Sir John Jervis, with his fleet close hauled on the starboard tack, steered for the opening between the two divisions of the Spanish fleet, which were rapidly approaching one another, the weather division with the wind on the port quarter, the lee division close hauled on the same tack as the British.

The vans of the Spanish weather division and the British fleet having cannonaded one another in passing, the lee division of the Spaniards made an ineffectual attempt to break through the British line as it was tacking in pursuit of the weather division. It was severely handled, and all except one ship withdrew from the battle. The weather division then attempted to effect the junction in rear of the British fleet, but Nelson was too quick. He promptly wore the Captain and threw her across the bows of the Santissima Trinidad (130), the sixth ship from the Spanish rear. The attacks of the British fleet were then concentrated on these six ships, four of which were captured; the Santissima Trinidad was only saved by the approach of eleven ships of her own side. It will be apparent from the above account that Sir John Jervis's admirable tactics, aided by Nelson's promptitude, completely neutralised the Spanish numerical advantage.

Turning to the parts played by individual ships: The Captain first attacked the Santissima Trinidad (130); the Captain and Culloden then engaged the San Ysidro (74) and Salvador del Mundo (112); and the former finally captured by boarding the San Josef (112) and San Nicolas (80), which had also been engaged with the Prince George (98). The Excellent (74) and then the Irresistible (74) and Diadem (64) engaged the Salvador del Mundo after she had been quitted by the Captain, and this 112 finally struck to the Victory (100). The Excellent, after quitting the Salvador del Mundo, caused the San Ysidro to strike, and then proceeded to engage the San Nicolas (80) until the Captain fell aboard of her. This action affords a conspicuous example of the advantage of numbers over size. The brunt of the action was apparently borne by the 74's above mentioned, which were commanded by such men as Troubridge, Collingwood, and Nelson, though the Blenheim (98) especially, as well as other ships, did a fair share of the work. On the other hand, it must be admitted that the fact that the Santissima Trinidad was not captured was due to her size and force.

Camperdown, 1797.

The forces engaged in this action were :—

British.	Dutch.
7 74-gun ships	4 74-gun ships.
7 64 ,, ,,	7 64 ,, ,,
2 50 ,, ,,	4 50 ,, ,,

Admiral Duncan's plan of action, like that of Lord Howe on the 1st of June, was for each ship to engage her opponent in the enemy's line. The Dutch line was broken, but, as on the 1st of June, the victory was really won by overwhelming a part of the Dutch force in the superior numbers. The Berschenner (50) retired early from the action rather than fight the Lancaster (64), and her example was followed by five other Dutch ships. In his report to the Batavian Government, Admiral de Winter stated the desertion of these six ships to have been one of the principal causes of his defeat. The British thus not only possessed an advantage in the size and power of individual ships, but they had a decisive superiority in numbers, against which the noble resistance of the Dutch ships was of no avail. The victory was decisive; two 74's, five 64's, and two 50-gun ships were captured. The British fleet lost over 1000 in killed and wounded.

The respective forces engaged in Aboukir Bay were :— Battle of the Nile, Aug. 1st, 1798.

British.		French.
13 74-gun ships	. . . . .	1 120-gun ship.*
1 50 ,, ,,	. . . . .	3 80 ,, ,, *
	. . . . .	9 74 ,, ,,
		frigates.

This action is exceedingly simple. The French fleet was at anchor. The van of the French line was overwhelmed by numbers, the rear, which was unable to come to its assistance, being left to be dealt with after the van had been subdued. Twelve British 74's † and one 50 were opposed to five French 74's, two 80's, and the Orient, 120. Six anchored on the outside, six on the inside of the French line. The Leander took up a position in the middle of the French line, where, without being much exposed herself, she was able to rake the Franklin, Orient, and Tonnant.

The whole of these eight French ships were captured or destroyed, and of the remainder of the fleet only the Généreux (74) and Guillaume Tell (80) escaped. There are two points that must be noted: (1) The Bellerophon, which had anchored abreast of the Orient, was compelled to withdraw from action with a loss of 49 killed and 148 wounded by 8.30 P.M.; but the Swiftsure (74) took the place of the Bellerophon; and the Orient was in action with her when she blew up. The size and force of the Orient were of no avail against superior numbers. (2) the Leander (50) played an important part in the action.

* James asserts that one French 120 = two British 74's in force, and that three French 80's which carried 24-pdrs. on their main deck = five British 74's.

† The Culloden ran ashore on entering the Bay.

Copenhagen, 1801.

For the action at Copenhagen, Lord Nelson had no ship larger than a 74—the two 98-gun ships of the fleet being left with Sir Hyde Parker.

Gut of Gibraltar, 1801.

Sir J. Saumarez with one 80 and four 74's attacked a Franco-Spanish fleet—two 112, one 96, three 80, and three 74-gun ships—at night.

The two 112's blew up; one French 74 was taken. We should add that the Venerable (74) was distinctly worsted in her contest with the Formidable (80), though she was assisted by the frigate Thames, and, according to Troude, by the Cæsar (80) as well. The force of the Formidable, according to James, was equal to that of a British 98, and stood her in good stead on this occasion.

Sir Robert Calder's action, 1805.

The forces engaged were as follows :—

British Fleet (15 Ships).		Franco-Spanish Fleet (20 Ships).
4 98-gun ships	. . . . .	6 80-gun ships.
1 80 " "	. . . . .	2 78 " "
8 74 " "	. . . . .	10 74 " "
2 64 " "	. . . . .	2 64 " "

Sir Robert Calder from to leeward brought on a partial engagement with the French rear. The Firme (78) and the San Rafael (80) were captured. The Windsor Castle (98) was the only ship disabled in the British fleet. The decisive incidents of this action only show that size was of no avail against numbers.

Trafalgar, 1805.

British Fleet (27 Ships).		Franco-Spanish Fleet (33 Ships).
3 100-gun ships	. . . .	1 130-gun ship
4 98 " "	. . . .	2 112 " "
1 80 " "	. . . .	1 100 " "
16 74 " "	. . . .	6 80 " "
3 64 " "	. . . .	22 74 " "
	. . . .	1 64 " "

Nelson's plan of battle at Trafalgar is discussed by Captain Mahan in his later work on the 'Influence of Sea-Power on the Wars of the French Revolution.'* Nelson's intention of attacking from to windward was apparently to draw his fleet up in two columns parallel to the enemy and abreast his rear. The lee column, composed of sixteen ships, would attack the twelve rear ships, while the weather column would hold the remainder of the hostile fleet in check. The essential feature of the plan, whether attacking in line or column, was to overpower twelve of the enemy's ships by sixteen of his own, while the rest of the fleet covered the operation. This plan he substantially carried out on the day of battle.

The Franco-Spanish fleet was broken in the centre by the leeward column astern of the Santa Anna, the sixteenth ship from the

* Vol. ii. p. 189.

rear, and by the weather column headed by the Victory astern of the Bucentaure, the twelfth ship from the van. The Redoutable was the fourteenth ship in the Franco-Spanish fleet. Of the nineteen ships astern of her, twelve were captured or burnt, seven escaped. "La colonne ennemie n'attaqua toutefois pas tous les vaisseaux de l'arrière garde en même temps ; son feu fut dirigé sur un petit nombre qu'elle mit d'autant plus facilement dans l'impossibilité de manœuvrer qu'au lieu de venir en aide à ceux-ci les autres laissèrent porter, pour chercher sous le vent de la ligne un abri qu'ils ne trouvèrent pas. Abandonnant les premiers dès qu'ils les jugèrent hors d'état de les inquiéter désormais, les Anglais combattirent les autres en détail."* The principle of overwhelming by numbers and destroying in detail was applied not only to the whole of the enemy's fleet, but also to that particular portion of the fleet (the rearguard) which was selected for attack. Of the remaining fourteen ships, three only were captured in their places, viz., the Redoutable herself and the Neptune, which were in that portion of the line between the points where it was broken by the two divisions of the British fleet, and the Bucentaure ; three others were captured afterwards. The Santissima Trinidad, Bucentaure, and Redoutable were subject for three hours to the attack of nearly the whole weather column.† It was not till 2.30 P.M., by which time the height of the action was over and many of the ships in the Franco-Spanish centre and rear had already surrendered, that the van, consisting of ten ships, which had as yet taken no part in the action, began to put about—a manœuvre which, on account of the lightness of the wind, they took a long time to execute. Nelson had, by the tactics adopted, succeeded in neutralising the enemy's advantage in numbers ; he brought the whole of the British fleet to bear upon the centre and rear of the enemy's fleet, and overwhelmed them by numbers before the van could come to their assistance.

Turning to the part played by individual ships as bearing on the question of large dimensions. The long resistance of the Redoutable (74) to the combined attacks of the Victory (100) and Téméraire (98) is remarkable. No ship was ever more nobly fought than the Redoutable at the battle of Trafalgar. The Santissima Trinidad (130) was subdued by the attacks of three 74-gun ships—first the Leviathan, and then the Conqueror and Neptune. Of these the first lost 4 killed and 22 wounded, the second 3 killed and 9 wounded, the third 10 killed and 34 wounded. The Achille E. (74) silenced the Argonauta (80) after a cannonade of one hour, the former losing 13 killed and 59 wounded, the latter about 400. The Dreadnought (98) drove the

* Troude : 'Batailles Navales,' vol. iii. p. 377.

† Troude : vol iii. p. 392.

Principe de Asturias (112) out of action. Previous to this the Revenge (74) had engaged the Asturias as well as three other ships. The Africa (64), after being fired at by several of the van ships, engaged the Intrépide (74) for three-quarters of an hour, but her fire was nearly silenced when the Orion interposed, thus showing that a 64 was not fit to "lie in the line." The captures included one 130-gun, one 112-gun, three 80-gun, and thirteen 74-gun ships. There are no indications in this action that the larger ships were generally successful. The 74's on both sides seem to have been fully capable of coping with their larger opponents.

Sir R. Strachan's action, 1805.

The British squadron consisted of one 80, three 74's, and four frigates; Admiral Dumanoir's squadron of three 74's and one 80, the Formidable, which had escaped from Trafalgar. All the French ships were captured. Sir Richard Strachan first attacked the rear of the French squadron. The Scipion and Mont Blanc were first assailed by three British ships, and the frigates.* The Hero and Namur (74's) successively attacked the Formidable (80) and caused her to strike. The Duguay Trouin, the French van ship, was the last to strike, three-quarters of an hour after the Formidable. The Cæsar (80) was at the time approaching. The action is noteworthy as affording yet another illustration of the principle of overwhelming by numbers and destroying in detail, and in that the frigates Phœnix and Révolutionnaire took an active part with the Courageux (74) in the attack on and capture of the Mont Blanc (74).

Sir John Duckworth, West Indies, 1806.

British squadron: one 80, five 74's, and one 64. French squadron: Impérial (120), the finest ship in the French service, the Alexandre (80), and three 74's. The whole of the French squadron was captured or destroyed. The Agamemnon (64) was unable to get up in time to take much part in the action, so that the contest lay between one 80 and five 74's, and one 120, one 80, and three 74's.

If the force of a French 120 was equal to that of two British 74's, the combatants were therefore about equally matched in point of force. If size was of greater value than numbers, the French should have won the day, and the Impérial should never have been captured. As a matter of fact there is no action in the whole course of the war which better illustrates the advantage of numbers over size. The Impérial was for some time closely engaged by the Northumberland (74) alone, and subsequently by the Superb (74) and the Canopus (80). The Northumberland lost 21 killed and 79 wounded, but the loss of the Impérial amounted according to French accounts to 500 in killed and wounded out of a crew of about 1200.

* Troude.

It has already been said that ships of an inferior class were no match for those of a superior class. Instances could be quoted to show that within certain limits superiority of numbers did not compensate for inferiority of size and power. In 1798 the Lion (64) engaged four 34-gun frigates, and captured one of them. Nelson's meeting with the French frigates on 22nd October, 1793, is another instance in point, though Nelson himself considered that three 40-gun frigates and a corvette had great superiority over a 64-gun ship.

Ships of inferior class no match for those of superior class.

SINGLE-SHIP ACTIONS.

In the Great War there were but few cases of engagements between single battleships. These are given below, and can hardly be held to strengthen the argument on either side :—

Actions between line-of-battle ships.

(1) 1806—London (98) and Amazon (38) capture Marengo (74) and Belle Poule (40).

(2) 1804—Lion (64) and Penelope (36) can effect little against Guillaume Tell (74) till the Foudroyant (80) comes up, though their attack succeeded in delaying the larger ship and ensured her capture.

(3) 1804—Centurion (50) beats off Marengo (74), Atalante (40), and Sémillante (36).

(4) 1798—Généreux (74) captures Leander (50).

	Généreux.	Leander.
Broadside lbs.	1024	432
Crew	936	282
Tons	1926	1052

The Leander was only captured after six hours' fighting, and after inflicting a loss of 288 in killed and wounded as compared with her own loss of 92 men.

(5) 1808—Stately and Nassau (64's) capture Prinz Christian Frederic (74).

In the first two actions, the larger ship was successful; in the third and fifth, the smaller ship or ships were successful. The action between the Leander and Généreux may be claimed as an example of the value of size. It is at any rate a remarkable instance of the endurance of the smaller ship against one of greatly superior size and force, and it would appear that the number of the crew of the Généreux (more than treble that of the Leander) was the principal element in her success, whilst the temper of the crew of the Leander, which had just taken a conspicuous part at the battle of the Nile, was the chief reason of her prolonged resistance.

Turning to the single-ship actions between frigates. Owing to the fact that the Forte is the solitary instance of a 24-pounder frigate being captured by an 18-pounder 38-gun frigate, and owing to the

Actions between frigates.

easy victories which were won by the American frigates United States and Constitution over the Java, Guerrière, and Macedonian, it is assumed that the experience of the Great War is entirely in favour of large dimensions for frigates. From a careful analysis of these single-ship actions between frigates, accepting the force and dimensions given by James to be accurate, it appears that the smaller ship was as often successful as the larger. In twenty-one cases the smaller ship actually captured the larger. In eleven cases the smaller ship succeeded in beating off her superior assailant; and in three cases out of eleven it was a sloop that saved herself from capture by a frigate. On the other hand, the larger frigate succeeded on twenty occasions in capturing the smaller. What may the results of this analysis be held to show? That in single-ship actions between frigates, victory did not depend so much on the size or force of the ships engaged as on the quality of the crew or commander. The United States and Constitution were so considerably superior in size or force to the frigates which they captured (they were over 1500 tons, while their opponents were under 1100 tons according to James, though according to Mr. Roosevelt over 1300 tons), that victory would possibly have rested with them had they possessed the inferior crews. But Mr. Theodore Roosevelt in his book on the War of 1812—which is a fairer and more trustworthy authority than James for those actions in which the Americans were concerned—attributes the easily-won successes of the United States and Constitution more to the superiority of their crews in gunnery, than to the superiority of the ships themselves. He even goes so far as to say of the fight between the Constitution and Java that the odds in men and metal, which were as ten to nine in favour of the victors, might have been reversed without vitally affecting the result. In the action between the Shannon and Chesapeake the ships were fairly evenly matched; but Captain Broke had carefully trained his crew in gunnery, while the crew of the Chesapeake had had little, if any, training together. The result was a victory for the British ship won in less than fifteen minutes. There is little in the frigate actions of the Great War to show that for frigates or cruisers it would be advisable to sacrifice numbers for size.

A Student of Naval History.

CHAPTER XI.

The Naval Revolt in Brazil.

The following account of the naval operations at Rio de Janeiro and elsewhere during the six months' continuance of the revolutionary outbreak in the Republic of Brazil is compiled from various authorities.* To those named below, as well as to many others who have aided me, I offer my most grateful acknowledgments and thanks. It is felt that it would be neither interesting nor suggestive to give here a consecutive chronicle of events as they happened from day to day, seeing that during the six months, although there has been a certain amount of firing in nearly every period of twenty-four hours, the vast majority of those periods have been absolutely devoid of episodes that can influence the result of the campaign. I have therefore striven to direct the reader's attention more particularly to occurrences which either marked a distinct advance by one side or the other, or seem to point to lessons that may possess a certain practical value. I have also, for obvious reasons, avoided any consideration of the causes of the unfortunate quarrel, or its political aspects.

* * * * * *

The beginning of the revolt.

On the night of September 6th, 1893, the Brazilian Rear-Admiral Custodio Jose de Mello went on board the battleship Aquidaban, which was then lying in the harbour and flying the flag of Rear-Admiral Netto, who was on shore at the time, and, with the concurrence of the officers and crew, took possession of the vessel as a first step towards the deposition of Marshal Peixoto and the formation of a new Government. The greater portion of the Brazilian fleet at once joined him, and Admiral de Mello quickly seized the arsenals and magazines near Nictheroy on the eastern side of the harbour, and a number of Brazilian steamers, including several fast vessels of the Companhia Frigorifica, some tugs, and some lighters. He also seized stores, ammunition, and materials of various kinds at Ilha do Gobernador, to the north of the city of Rio. The days

* Chief among which ought to be mentioned a file of the *Rio News* (up to the date of its suppression by the government of Marshal Peixoto); the telegrams and letters of the Special Correspondent of *The Times* at Rio de Janeiro; charts and information generously supplied to me by Commander Robert S. Rolleston, R.N., Lieut. W. J. W. Steward, R.N., Mr. Constantine, of the Royal Mail Steamship Company, and others who are, or have recently been, in Brazil; official reports of the United States naval officers; and the admirable reports to the German Admiralty of Captain Hofmeier, I.G.N., of the Arcona.

immediately following the beginning of the revolt were devoted to the fitting out and organisation of the Revolutionary Fleet, which hoisted a white flag in addition to the national ensign of Brazil, and which was presently composed of the vessels (in addition to tugs, &c.) enumerated in the accompanying table.

THE REVOLUTIONARY FLEET.

Class.	Name.	Tons.	I.H.P.	Armament.
Battleship	Aquidaban	5,000	6,200	4 9·2-in.; 4 6-in.; 14 1-in. Nords.; 5 torp. tubes.
Cruiser	Almirante Tamandare	4,465	7,500	10 6-in. Q.F.; 2 4·7-in. Q.F.; 8 1-in. Nords.
Coast Defence Ironclad	Javary	3,640	2,500	4 10-in. Whitworth M.L.
Cruiser	Guanabara	2,200	3,000	8 6-in. Whitworth M.L.
Cruiser	Trajano	1,400	2,400	8 4-in. Whitworth; 4 1-pr. Q.F.; 4 1-in. Nords.
Transport	Purús	1,355	1,200	2 12-prs.
Cruiser	Republica	1,300	3,300	6 4·7-in. Q.F.; 6 6-pr. Q.F.; 12 1-in. Nords.; 4 torp. tubes.
Transport	Madeira	1,400	1,200	1 12-pr.
Gunboat	Marajó	450	400	2 6-in.; 2 6-pr. Q.F.; 2 1-in. Nords.
Ironclad Monitor	Alagoas	340	180	1 70-pr. Whitworth M.L.; 2 1-in. Nords.
Gunboat	Liberdade	250	280	4 12-pr. Whitworth; 4 1-pr. Q.F.; 4 1-in. Nords.
Torpedo-boat	Iguatemy	150	1,550	2 6-pr. Q.F.; 4 torp. tubes.
Torpedo-boat	Marcilio Diaz	150	1,550	2 6-pr. Q.F.; 4 torp. tubes.
Torpedo-boat	Araguary	150	1,550	2 6-pr. Q.F.; 4 torp. tubes.
Armed Merchant Vessel	Mercurio	1,121	200 N	Small Q.F. and mach. guns.
Armed Merchant Vessel	Jupiter	1,124	200 N	1 32-pr.; 2 6-pr. Q.F.; 1 3-pr. Q.F.; 4 12-pr. Whitworth.
Armed Merchant Vessel	Urano	1,119	185 N	4 3-pr. Q.F.; 2 1-in. Nords.
Armed Merchant Vessel	Venus	1,171	200 N	Small Q.F. and mach. guns.
Armed Merchant Vessel	Pallas	845	150 N	4 3-pr. Q.F.; 4 1-in. Nords.
Armed Merchant Vessel	Esperança	823	150 N	Small Q.F. and mach. guns.
Armed Merchant Vessel	Meteoro	1,082	116 N	2 6-pr. Q.F.; 2 3-pr. Q.F.; 2 1-pr. Q.F.; 4 1-in Nords.
Armed Merchant Vessel	Marte	1,121	185 N	Small Q.F. and mach. guns.
Armed Merchant Vessel	Vieira da Cunho	?	?	2 6-pr. Q.F.; 2 1-in. Nords.
4 Torpedo-boats	(Probably Nos. 1–4)	52	600	2 1-in. Nords.; 2 torp. tubes.

The Aquidaban, built of steel by Messrs. Samuda, at Poplar, in 1885, is a sheathed twin-screw, ship-rigged, high freeboard, double turret ship, measuring 280 ft. long by 52 ft. broad, drawing 18 ft. of water, and having a nominal speed of 15 knots. She has a partial compound belt of from 7 in. to 11 in. thick; the citadel and turrets have 10-in. armour, and there is a 2-in. steel overall deck. Her proper complement is 388 officers and men.

The Almirante Tamandare, built of steel and wood at Rio, in 1890, is a twin-screw ship-rigged, protected cruiser, designed to have a speed of 17 knots. She measures 294 ft. long by 47 ft. 3 in. broad, and draws 19 ft. of water. Her protective deck is 1·6 in. thick. She also has lightly armoured casemates, in which her heavier guns are mounted. Her proper complement is 450 officers and men.

The Javary, built of iron at Havre, in 1875, was a twin-screw double turret monitor, with a single signal mast. She measured 240 ft. long by 58 ft. broad, drew 11 ft. of water, and in her best days could steam at 11 knots. The belt armour varied from 6 to 12, and the turret armour from 11 to 13 in. thick. The iron deck had a thickness of 3 in. Her complement was 112 all told

The Guanabara is a wooden, single-screw, ship-rigged corvette, built in Brazil in 1877. When new she had a speed of 14 knots. Her complement is 240 officers and men.

The Trajano is a wooden, single-screw barque, built in Brazil in 1873. She was once able to steam at a speed of 13 knots. Her complement is 162 officers and men.

The Purús and Madeira, sheathed iron, schooner-rigged paddle-vessels, once capable of a speed of 12 knots, were built on the Thames in 1874 and 1873 respectively.

The Marajó, a sheathed, steel, brig-rigged, twin-screw gunboat, was built in Brazil in 1885.

The Alagoas, a wooden, ironclad, single-turret monitor, was built in Brazil in 1867, and partially reconstructed in 1886. The belt armour is from 2 to 4½, and the turret armour 4½ in. thick. She was designed for and employed in the Paraguayan war.

The Liberdade, formerly Affonso Celso, is a wooden, single-screw schooner, built in Brazil in 1884.

The Iguatemy, Marcilio Diaz, and Araguary, steel, twin-screw, 150 ft. Thornycroft boats, having a speed of 22 knots, were built at Chiswick in 1891.

The armed merchant vessels belong to the Companhia Frigorifica e Pastorel Brazileira, to the Empreza Esperança Maritima, to the Empreza de Obras Publicas do Brazil, and to Messrs. Irmão & Co., of Para.

The four 52-ton torpedo-boats are probably 110 ft. Yarrow boats, built at Poplar in 1882, and having a speed of 20 knots.

It may be noted that the Aquidaban and Guanabara visited New York in November, 1890, to return thanks for the United States' recognition of the Brazilian Republic; that the Aquidaban was again at New York for the Columbian Celebration in 1892; and that the Marajó in 1892 participated in the bombardment of Porto Alegre.

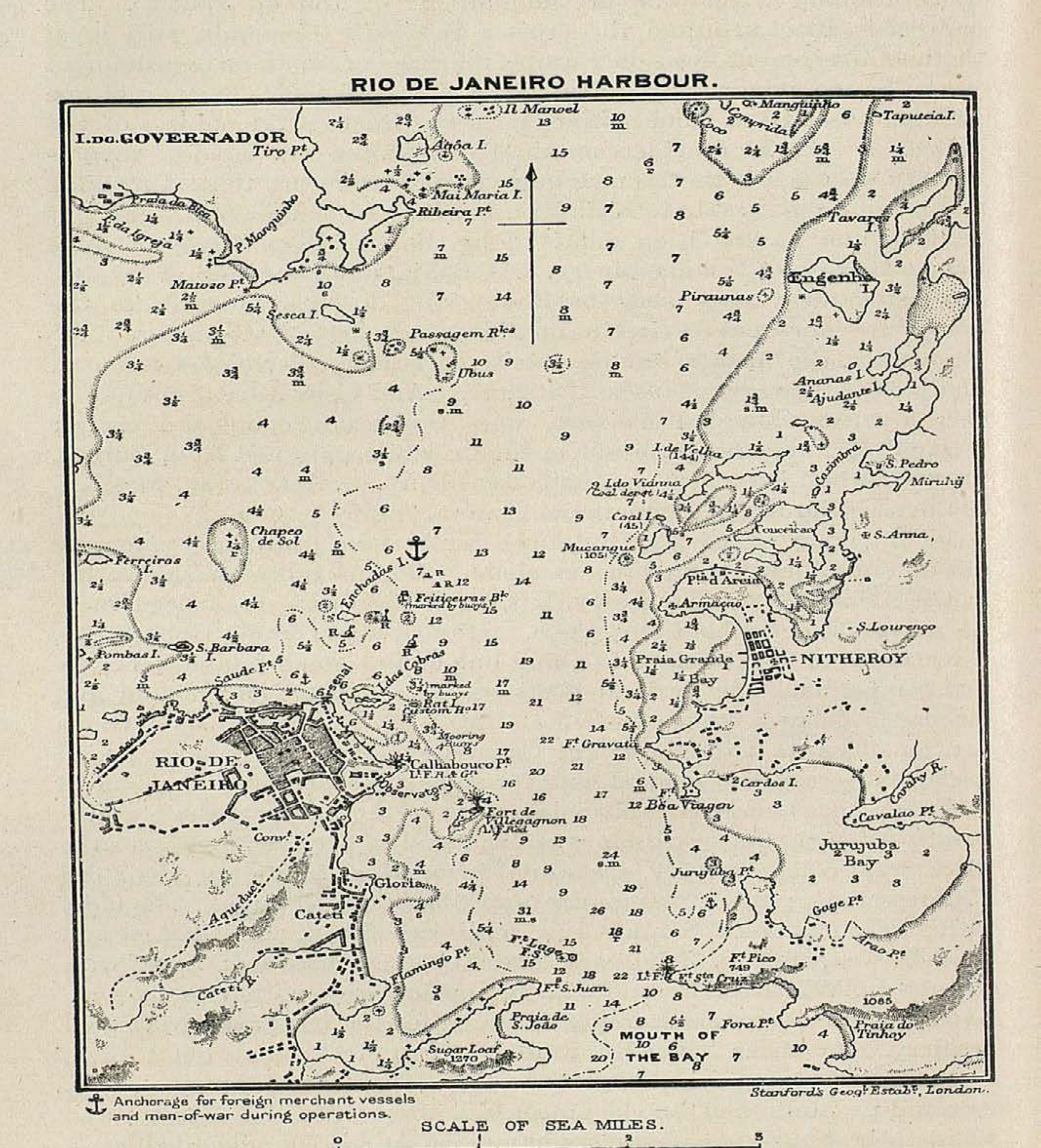
The position at this time was as follows: the bulk of the Revolutionary Fleet was in the harbour of Rio de Janeiro. The battleship Riachuelo and the cruiser Benjamin Constant, still loyal to the Government, were in Europe, undergoing repair or re-armament at La Seyne, where, in October, I met many of their officers, not one of whom seemed to trouble himself in the least on the subject of the rebellion. At Montevideo, nominally loyal, yet suspected of revolutionary leanings, were the new gun-vessel Tiradentes, the old monitor Bahia, and the gunboat Iniciadora, the first named having been put in dock, and having been deprived by the Brazilian Envoy of some essential parts of her machinery. At Bahia, in a condition of loyalty, but apparently very short-handed owing to desertions, were the composite gun-vessel Primeiro de Março and the old wooden gunboat Braconnot, the former having, for some reason, discharged her coal and part of her armament to the shore. And elsewhere, also more or less loyal to Marshal Peixoto, were the small composite cruiser Paranahyba, and the gunboat Cabedello, while expected from Europe, where she had been just completed by Sir W. G. Armstrong, Mitchell & Co., was the torpedo gun-vessel Aurora.

The position afloat. The first sortie from the Bay.

In the harbour of Rio, Admiral Mello was practically supreme afloat, but almost powerless on shore. He had a precarious footing at the Armação near Nictheroy, but, probably owing to lack of men, he never properly held the place. He had also Ilha do Gobernador, three miles to the north of Rio, and one or two small islands; but he had no permanently fortified posts on land. Fort Villegagnon and Enchadas Island, where Rear-Admiral L. P. de Saldanha da Gama was in office as Director of the Cadet School, at a very early period declared themselves neutral, and for some time remained so; but all the other forts and important points were in the hands of the Government. Villegagnon's attitude was beneficial to the insurgents, for the place was, comparatively speaking, formidable, mounting as it did 37 Armstrong guns of some size and 6 Whitworth guns. The chief Peixotist forts were Santa Cruz, with two 10-in. Armstrongs and smaller weapons; S. João, with one 10-in. Armstrong; Lage, with three 6-in. Whitworths; and a work at Nictheroy, with two 32 prs., besides a number of smaller works armed for the most part with field artillery. In these defences were between 7000 and 8000 men, including 5000 regulars, all armed with Mannlicher magazine rifles. Admiral de Mello had, at the outset, not more than 1500 men; and all his operations were obviously hampered by his short-handedness.

The position ashore.

Firing began at an early stage of the insurrection, the ships throwing shells at the forts, at Nictheroy, and at the batteries of the Rio defences, but making very bad practice and doing remarkably



RIO DE JANEIRO HARBOUR.
I. DO GOVERNADOR
Tiro Pt.
Praia da Bica
P. Manguinho
Matozo Pt.
Sesca I.
Il Manoel
Mai Maria I.
Ribeira Pt.
Passagem Rks
Ubus
Manguinho
Taputeia I.
Tavares I.
Engenho I.
Piraunas
Ananas I.
Ajudante I.
I. de Velha
S. Pedro
Mirutiy
I. do Vianna
Coal I.
Mucangue
S. Anna
Pta d'Areia
Armação
S. Lourenço
NITHEROY
Praia Grande
Bay
Chapeo de Sol
Ferreiras I.
Enchadas I.
Feiticeiras Bk
Pombas I.
S. Barbara I.
Saude Pt.
I. das Cobras
Rat I.
Custom Ho.
Calhabouco Pt.
RIO DE JANEIRO
Observatory
Fort de Villegagnon
Ft. Gravata
Cardos I.
Boa Viagem
Cavalao Pt.
Jurujuba Bay
Jurujuba Pt.
Gage Pt.
Conv.
Aqueduct
Gloria
Cateti
Cateti R.
Flamingo Pt.
Ft. Lage
Ft. S. Juan
Ft. Pico
Ft. Sta. Cruz
Praia de S. João
Sugar Loaf 1270
MOUTH OF THE BAY
Fora Pt.
Praia do Tinhoy
Stanford's Geogl. Estabt., London.
Anchorage for foreign merchant vessels and men-of-war during operations.
SCALE OF SEA MILES.

little damage. The first important event took place on the morning of September 17th, when the Republica and the Marcilio Diaz, in spite of a heavy fire from all the Peixotist guns that would bear upon them as they went, got safely out of harbour. On the next day they were followed, with equal impunity, by the armed "frigorificos" Pallas and Marte, which, for the passage, protected themselves with cotton-bales, after the fashion set by the Americans in the War of Secession, and by the torpedo-boat Iguatemy. The object of this rather daring sally was to convey support to the insurgents in Santos, Santa Caterina, and Rio Grande. The foreign warships, anchored to the north-east of Enchadas Island, consisted of the British vessels Sirius, Beagle, and Racer, the French vessel Aréthuse, the German vessels Arcona and Alexandrine, the Italian vessels Giovanni Bausan, Dogali, and Sebastiano Veniero, and the Portuguese vessel Mindello. The senior officers of each nationality had already adopted such measures as seemed reasonable for the protection of neutral trade and of foreign life and property. A bombardment of the city had been threatened for the night of September 18th, but as the foreign officers had succeeded in obtaining from Admiral de Mello an assurance that he would not fire unless fired upon, and from President Peixoto a similar undertaking, the bombardment did not take place, and it looked for the moment as if the town might be spared from such an ordeal.

Boyton's attempt.

From September 18th to the end of the month there was hot firing every day, chiefly between the ships and the forts; but, owing to the action of the Government in rather ostentatiously strengthening its position in Rio, the Melloists on the 25th and 26th fired into the town, without, however, doing much damage. On the 22nd, 160 shells were thrown by the forts against the ships, and *vice-versâ*, but no apparent damage was done on either side. On the 23rd, Santa Cruz fired 85 projectiles, but only succeeded in setting fire to a Melloist hulk, which was very little injured ere the flames were extinguished. The Tamandare, which was not then completed, and the Alagoas, which was engineless, took a share in some of the affairs of this month, being towed within range of the forts. On the 25th and 26th the Government forces made a weak and ineffectual attempt to seize Cobras Island, which had been partially occupied by the insurgents; and on the 27th an American adventurer named Boyton, who was said to have been promised £25,000 for the business, was caught while preparing, under the protection of the British ensign, to blow up the Aquidaban by means of 100 lbs. of dynamite. His launch was confiscated by the Sirius, and he and his fellows were delivered up to an American man-of-war which had by that time arrived in the

Bay. It does not, however, appear that this disgraceful abuse of the flag was punished as it deserved. At the end of the month, President Peixoto was induced by the foreign ministers at Rio to dismantle the batteries which had previously provoked Admiral de Mello into firing upon the city. One only remained at S. Bento, on the Arsenal Point.

Damage to the Aquidaban.

In the course of an action between the ships and the forts on the 30th, some little damage was done to the Aquidaban, the following details of which were noted on the spot by Sub-lieutenant von Obernitz, of the German Navy. Five projectiles in particular struck the ironclad. No. 1, probably a 6-in. shell, passed through the deck into the admiral's sleeping cabin, and there burst. Bulkheads were destroyed, but no fire was occasioned. No. 2, a 6-in. solid shot, penetrated the starboard side and struck a 6-in. shell standing in the rack on the battery deck. The shell, which was ready fused, exploded, wounding an officer and three men. No. 3, a shell, penetrated on the starboard side into the admiral's bath-room, but apparently did not burst there, although it caused a certain amount of destruction of fittings. No. 4, a shell, penetrated on the portside amidships, and burst in a port coal-bunker. The orifice in the ship's plating, there being no armour at that spot, was only of the size of the circumference of the projectile. In the inner wall of the coal-bunker there were two irregular holes, through which fragments entered the vessel and wounded a man. No. 5, a solid shot, struck the armour shield of the port bow gun, but did not do any damage sufficient to impair the working of the weapon. In addition, several solid shot struck the armoured portions of the hull. Most of them left only slight indentations. Admiral de Mello collected five 6-in. Whitworth projectiles which came on board that day, and set them up in his cabin. The ship's injuries were insignificant.

Events in October.

Early in October the S. Bento battery, which remained upon the Arsenal Point, seems to have provoked Admiral de Mello into again firing on the city. It was, in consequence, dismantled on the 6th. Three days later Fort Villegagnon, with its garrison of upwards of 700 men, ceased to be neutral and joined the insurgents; and on the 10th it supported the ships in their first really heavy bombardment of Forts Santa Cruz, S. João, and Lage. The Government reply was very ill-directed. On this and previous occasions hundreds of projectiles were fired at the wooden corvette Trajano, yet she received no damage worth mentioning. Nor did the forts suffer much more severely. An enormous proportion of the shots from both sides fell short. This has been attributed rather to the bad or varying quality

of the powder used than to the inefficiency of the gunners; but reports from persons who carefully watched the practice show that badness of powder alone cannot explain the extraordinary wildness of the firing, and many eye-witnesses declare their conviction that the wretched shooting was, to some extent at least, intentional. From October 10th onwards the bombardment of the forts was renewed at frequent intervals. At the same time, the Javary and Guanabara, anchored off Nictheroy, kept up day after day an occasional fire upon that town in order to prevent the Government forces from throwing up fresh works.

Departure of the Urano.

In the meanwhile the Provisional (revolutionary) Government of Brazil had established its seat at Desterro, Santa Caterina, and thither, on the night of October 12, was despatched from Rio the armed "frigorifico" Urano with a reinforcement of about 200 Melloist troops. Fort Santa Cruz hit her badly as she went out; she lost about 40 killed and wounded; a great many of the survivors became panic-stricken and left her in boats for the shore, where they were taken prisoners by the Government forces; and although the vessel, after some delay, proceeded, it is not certain that she reached her destination. On the other hand, the Melloists, a few days later, were able to claim that their cruiser, the Republica, had rammed and sunk the Government hired steamer Rio de Janeiro while the latter was carrying 1100 troops from Santos, and that of all on board only about 600 were saved.

Supplies drawn from the Armação.

Towards the end of the month the operations near the capital became more active than they had been for several weeks previously. The Melloists had, ere that time, begun to remove on board ship guns and large quantities of ammunition from the Armação, and had occupied, and betrayed some intention of fortifying, Mucangue Island. On the 25th the Government troops from Nictheroy made a resolute but vain attempt to seize the Armação, and so to prevent the further strengthening of the rebel position in that quarter. On the same day, in the course of the firing, the ships, aided by Villegagnon, silenced Fort Lage for a time, and in the afternoon a lucky shell from a field-gun at Nictheroy blew up a temporary magazine which the insurgents had established at Mucangue, destroying eighty tons of powder. On the night of the 27th the Melloists mounted a battery of guns, said by some authorities to be 4-in. Whitworths, and by others to be quick-firers, on the same island, and on the 28th a hot fire was opened between them and the Government works on Ponta d'Areia; but little harm was done. On the 29th Villegagnon suffered much from the guns of S. João and Sta. Cruz, which between them fired 329 projectiles. The Melloist

Explosion at Mucangue.

fort replied with 59, only eight of which were of large calibre. On the 30th a body of insurgents landed at Barreto, a suburb of Nictheroy, with the object of turning the Government troops, which were attacking the Armação, and their action was supported by the mounting of an additional gun of some size on Mucangue. This got into action on the following day, when, to divert attention, Admiral de Mello sent a couple of small craft to annoy with gun-fire the troops posted on the hill behind Gloria and along the Praia do Flamengo; and S. João and Lage, in retaliation, vigorously renewed the bombardment of Villegagnon.

Operations in November.

The early days of November were utilised by the insurgents in further attempts to turn the Government position at Nictheroy. For this purpose the Guanabara was towed within range of Santa Anna, though she still continued to fire on Ponta d'Areia. On the 3rd November, at 3.45 P.M., occurred the lamentable explosion of Melloist magazines on Ilha do Gobernador, whereby Lieutenants Mowbray and Tupper, Mr. Harris, boatswain, R.N., and two seamen, belonging to the British Squadron, lost their lives, they being at the time close to the spot in search of sand. The disaster was undoubtedly due to the enterprise of Government emissaries and to the bad watch kept by the insurgents over their depôts, and not to the effects of gun-fire. Marshal Peixoto is said to have waited for and witnessed the explosion, which destroyed upwards of 100 tons of prismatic and pebble powder, several hundred barrels of rifle powder, and two hundred loaded 10-in. Whitworth shells, besides other ammunition.

Renewed bombardment.

The foreign representatives at Rio had reason for hoping that the promises of Admiral de Mello and Marshal Peixoto and the dismantling of the shore batteries would protect the city from further bombardment; but their expectations were disappointed by an unforeseen incident which occurred on 4th November, when a soldier, in front of the Misericordia Hospital, thoughtlessly and without authority fired his rifle at Fort Villegagnon. This petty episode was interpreted as an excuse for reprisals, and on several subsequent days both Villegagnon and the ships fired, chiefly with small guns and rifles, at the troops and buildings on shore. On the 5th Villegagnon was badly annoyed by the excellent practice of some field-pieces on the heights above S. João, and was for a time nearly silenced. On the 6th, 8th, 9th, 11th, and 15th, especially, many people on shore were hit. On or about the 6th Admiral da Gama abandoned his attitude of neutrality, and, casting in his lot with the insurgents, carried over to them not only his influence, which was considerable, but also Enchadas Island, with its invaluable slip, stores, hospitals, and other buildings. On the 8th the action

between the forts was unusually heavy, the Government guns throwing 597, and those of Villegagnon 177 projectiles, many of which were large. The 10-in. Armstrong, called "Vovo," at S. João was reported to be dismounted, but, if so, was repaired by the 20th, when it fired four rounds at Villegagnon. The most conspicuous Government success of the day was the sinking, by a shell from a field-gun on shore, of a torpedo-boat which lay in the centre of the harbour near the Aquidaban. From this time the insurgent gunnery somewhat improved, and, on the 10th, Villegagnon dismounted a gun in Fort Lage, which, in addition, lost heavily, as it did again on the 12th. The developments of the middle of the month included the occupation and fortification by the insurgents of Rat Island (Ilha Fiscal), the seat of the Custom House establishment; the renewed attempts of the garrison of Nictheroy to prevent the insurgents from drawing further supplies of guns and ammunition from the Armação; the throwing up by the Government of many new works on the sea front of Rio de Janeiro; the commissioning of the Tamandare; and further firing upon the city, on the hills behind which the Government had mounted several guns.

Rat Is. occupied.

On the 22nd, an event of more special interest occurred. The Javary had been for some time very frequently engaged, particularly with Fort Gravata and the shore batteries between that point and the Armação, and had considerably shaken her by no means modern hull. In the afternoon of the day in question she was in action at anchor near Villegagnon, where she was observed to be sinking. Several launches and tugs went at once to her assistance, and endeavoured to tow her up the Bay into shallow water, but, ere she had made much progress, it became clear that she could not be saved, and her crew was removed. Her heavy guns, however, had been left loaded, and, aware of this, a seaman returned alone, and managed to fire both of them at the Arsenal of War, only a minute or two before the ship turned over and sank. The vessel had been frequently struck by projectiles from the forts, but these had not seriously damaged her, and the fatal leak occurred in a position which no shell from the enemy had, or could have, reached. The shaking occasioned by her own fire was undoubtedly the sole cause of her loss.

Loss of the Javary.

On the 26th the Government troops from Nictheroy occupied the Armação, and, having entrenched themselves there, were attacked on the 27th by a Melloist landing party, which, though it was repulsed, caused the Government forces also to withdraw. Thus the Armação was for the time unoccupied by either side, and both sides by stealth began to draw supplies from it. The

Government occupy the Amação.

Melloists made a second attack on it on the 28th, and were again repulsed by troops brought up for the purpose. On the 29th and 30th they vigorously bombarded the place. In the course of the firing on the 29th, a tug which had the Trajano in tow was struck and sunk, and during that of the 30th the Guanabara knocked a big hole in the north wall of Fort Gravata, and received in return a shell which burst on her deck. Another event of this period was the taking over, on the 29th at Pernambuco by the Government, of the new torpedo gun-vessel Aurora, which had arrived from England. She was renamed the Gustavo Sampaio, but that name was presently abandoned in favour of the original one. On the night of the last day of the month occurred the most interesting episode in the history of the early part of the campaign. I translate Captain Hofmeier's account of it:—

Departure of Aquidaban.

"On November 28th, Admiral de Mello communicated through his flag-lieutenant the news that the Aquidaban would presently quit the harbour. Her projected destination was not specified. In the night between November 30 and December 1, at about 12.30, the vessel, in company with the armed steamer Esperança, and under the full glare of the search-lights of Santa Cruz and S. João, departed, being fired at by every gun in the forts at the harbour mouth; and both ships spiritedly returning the compliment. It was exceedingly interesting to watch how the ironclad made every possible endeavour to draw upon herself the beams of the search-lights in order to facilitate the exit of the steamer. The two vessels went first to Ilha Grande, where they filled up with stores, and, it seems, took whatever Government funds they could find, and then steamed on to the southward. An officer of the Beagle, to whom Admiral de Mello showed his ship while at Ilha Grande, reported that the Aquidaban had received a shell in one of her coal-bunkers, and that a large number of small projectiles had fallen on deck, but that the vessel had sustained no sort of serious damage, and that not a man of her people had been killed or wounded. A shell had passed clean through the Esperança, which had had a cylinder somewhat injured, and a few men wounded, but neither the working of the machinery nor the seaworthiness of the vessel had been interfered with. Bearing in mind that the departure of the ships was, so to speak, announced beforehand; that the search-lights of S. João and Santa Cruz worked admirably, and that three forts commanded the passage at a range not exceeding seven cables, one must admit that the success of this smart and cleverly carried out affair was very much owing to good fortune." It appears from other sources of information that before the actual moment of sortie, a third search-

light, placed in Gloria, had been extinguished by a shot from Villagagnon, and that later the S. João search-light was damaged. The Aquidaban herself used no lights. As soon as she was outside, she stopped awhile in order to bombard the Government military school. It also appears that the Esperança's chief engineer was killed. A British naval officer who was at the time upon the station tells me: "From the manner in which Admiral de Mello's 10-knot ships passed the forts at such close range, under so heavy a fire, and on a clear night, it seems to me that it would always be fairly safe at night to run past any fort the guns of which were without illuminated sights. These alone will enable the battery to be worked in comparative darkness, and objects outside to be properly seen." And this, I venture to think, is the most useful lesson of the episode. When the Aquidaban returned in January, she entered in the early morning and caught the forts napping.

Da Gama becomes leader.

For the ten days after the departure of Admiral de Mello in the Aquidaban the local leadership of the insurgents seemed to be in some doubt, but on 10th December, Admiral da Gama formally announced that he had undertaken the direction of operations in the Bay of Rio. At or about that time the foreign warships on the spot were the British vessels Sirius, Beagle and Racer, the United States vessels Newark, Charleston and Detroit, the Italian vessels Giovanni Bausan, Etna and Dogali, the French vessel Magon, the Portuguese vessels Mindello and Alfonso de Albuquerque, the Austrian vessel Zriny, the Spanish vessel Cristobal Colon, and the Dutch vessel De Ruyter.

His measures.

Admiral da Gama's first efforts were directed to stopping the trade of the capital by means of fire from Cobras Island upon the Arsenal da Marina and the quays in its neighbourhood whenever it looked as if vessels desired to discharge there. He also deterred Brazilian boatmen and labourers from venturing upon the water by the assurance that, if he caught them, he would send them to work the guns in Villegagnon. These measures did much towards impeding the loading and unloading of ships.

The Government squadrons.

By the beginning of December, President Peixoto's emissaries abroad had procured for him some semblance of a fleet. Of warships proper he had already, more or less under Government control, the Riachuelo, Benjamin Constant, Paranahyba (many of whose crew were in December shot at Bahia on suspicion of disaffection), Cabedello, Tiradentes, Bahia, Iniciadora, Primeiro de Março, Braconnot, and Aurora; but he had neither made nor attempted to make any use of them, and it has not yet been explained why, when he could not utilise such regular warships as he had, he thought it desirable to purchase other craft with the object of employing them

on warships' duties. But the fact remains. Arrangements, on behalf of the Brazilian administration, were made for the purchase, not only of the experimental American torpedo-gun carrying vessel Destroyer* (a pet invention of Ericsson in his old age), of a second-class Yarrow torpedo-boat, and of five Schichau torpedo-boats of the Adler type, which happened to be for disposal at Elbing, but also of the United States and Brazil Mail S.S. Co.'s boats, Advance, Alliança, Finance, Segurança, and Vigilancia, of the Morgan Line steamers El Cid (renamed Nictheroy) and El Rio (renamed Rio de Janeiro), of the 18-knot steamship Britannia (renamed America), of a 22-knot 25-ton yacht, the Nada, of the still faster yacht Fessein, and of several other vessels. In the Nictheroy was fitted a dynamite gun of the Zalinski type, and three of the fast small craft were placed on her deck. In the America was installed a Sims-Edison torpedo apparatus. Other ships had Krupp and miscellaneous guns mounted in them; and one by one the members of this heterogeneous fleet—several of them after many misadventures—arrived at Pernambuco and other Brazilian ports of rendezvous. There the majority of them remained in idleness for nearly three months.

Operations in December.

On December 3rd the Almirante Tamandare, which a week later hoisted the flag of Admiral da Gama, and which, though she still had only one engine completed, could steam at a speed of about 6 knots, took up the Aquidaban's old anchorage and began to fire on Nictheroy; but, soon discovering that her wooden hull was too much exposed, she on the 4th moved further up the bay. That night, it appears, a "frigorifico" safely ran past the forts and got away to the southward. Other events of importance were few until December 9th, when the Government, much incommoded by the rebel position on Cobras Island, made an attempt upon it, but suffered a repulse. A day or two later Cobras vigorously engaged some new batteries in the arsenal. It was probably with a view to eventually reducing this thorn in the side of the Government that, on the 15th, General Silva Telles, with 1000 men, was ordered to endeavour to establish himself on Ilha da Gobernador. The insurgents utilised the island in various ways, but had not felt themselves strong enough to occupy it in force. Upon seeing what was intended, Admiral da Gama put 200 men and four field-pieces ashore, and when General Telles and his troops waded over from the mainland, they were so hotly received that they soon retired. The General himself was mortally wounded, and died on the 22nd. Having thus repulsed the attack, the Admiral re-embarked his forces, which could not be spared from the ships.

On the 21st the Government in some measure compensated itself

* For description, see page 48.

for this check by attacking and taking Mucangue, which it held for nearly a month, although the island was continually and heavily shelled by the Tamandare and Jupiter. During her engagements on the 22nd with Mucangue, a new battery at Nictheroy, and another new battery in the Armação, the Almirante Tamandare used ballistite in her 6-in. guns, firing 17-lb. charges. She was several times hit, but not seriously hurt; and she suffered in the same way on the 28th. The end of the year found Admiral da Gama in some straits, especially for men. The Government was daily mounting more guns around the harbour, and reinforcements which had been promised him by Admiral de Mello, who remained in the south preparing to attack Santos and other places, showed no signs of arriving, the real explanation being that there were at the time two if not more insurrectionary movements in Brazil, and that each regarded the other with some jealousy. In consequence, the party represented by de Mello and da Gama did not receive from the shore the support upon which it had counted.

The Government take Mucangue.

The year 1894 opened peacefully, there being little or no firing on January 1st; but on the 3rd the insurgents sent a party in boats, covered by fire from the Jupiter, Trajano, and two smaller craft, to attack the island of Engenho, which had been occupied by a small Government force with a view to annoying the Melloist launches, &c., as they passed from their depôts up the bay at Páqueta Island to the ships. The island was taken after a hot fight, and a 3·5-in. Krupp and a 70-pr. Whitworth were taken with it. A Government attempt at about the same period to seize Boqueirão Island, where the Melloists maintained a magazine, was defeated, and the two little successes greatly inspirited the insurgents, who, on the 9th, occupied Conceição Island with 250 marines.

January, 1894.

On the 12th the Aquidaban steamed in in the early morning before the forts had been aroused, and ran past them without being touched; but when she was three miles up the harbour, two projectiles from a gun at the Armação hit her, one passing through the ward-room and another through the forward part of the superstructure, the result being that two men were slightly wounded. Admiral de Mello was not on board. He had shifted his flag to the Republica and remained in the south.

Return of the Aquidaban.

On the 16th, on which day the Government forts maintained a hot fire upon Enchadas Island, the insurgents recaptured Mucangue after a very stubborn fight, storming the battery on the central hill, and then turning its guns upon the troops on Ponta d'Areia and at the Armação. Three Krupp field-guns, a Whitworth 70 pr., two hundred rifles, and a quantity of ammunition, thus fell to the

Mucangue Is. retaken.

Melloists. At about the same time the insurgents repulsed a Government attack on Conceição Island, and established themselves on the Petropolis railway on the Nictheroy side, in a position commanding the Nictheroy Gas Works, and on January 25th they retook the little island of Bom Jesus, to the north of the city. This had been seized in the middle of December by the Government, and, as the island had been up to that date the watering-place for the insurgent ships, the loss had occasioned some inconveniences. The Melloists, indeed, were making steady though very slow progress, both in the south and at Rio. They had occupied Paranagua and Curitiba, and they had begun operations against Santos.

Melloist difficulties.

But some of the most promising hopes of the rebels depended upon the success of Admiral da Gama's schemes for cutting off as much as possible of the maritime trade of Rio; and these were partially dashed to the ground when, on January 29th, Admiral Benham, the United States' senior officer, by means of a display of force, obliged the insurgent commander to permit merchant vessels to proceed, without interference, to the city wharves. The action was, of course, taken mainly in the interests of neutral and, in particular, of American commerce; but its effect could scarcely fail to be as beneficial to Marshal Peixoto as it was prejudicial to Admiral da Gama; and for this reason it was hailed by the Brazilian Government as a sign of American sympathy.

Insurgents use treachery.

The partisans of Admiral de Mello were in the meantime active, not only at Rio and in the South, but also at Bahia and Pernambuco, where the Government ships were still slowly preparing for action. Melloist emissaries seem to have been on board every one of these, and to have seized every opportunity for surreptitiously damaging the machinery, and even for imperilling the existence of the ships. A certain amount of harm was, from time to time, done in this way, but it was limited by the constant vigilance of a hundred and fifty Loyalist military cadets, who were distributed throughout the flotilla, and who afforded effective support to the body of Americans who served in the vessels. On shore at Rio also the insurgents endeavoured to make use of treachery. Admiral da Gama, having obtained some promises of assistance from two regiments of the National Guards, arranged to make a sudden landing in front of the city on February 5th, and would, not improbably, have been successful had not President Peixoto discovered the conspiracy and promptly arrested all the ringleaders. For a similar reason he found it advisable, at about the same period, to arrest and supersede the commanders of the Government warships Bahia and Tiradentes, and, a little later, the military commander of Santa Cruz.

On February 9th the insurgents in the Bay fell short, only by a very little, of winning a legitimate and considerable success. At 4 A.M. a body of 500 of them, coming from Conceição Island, landed undiscovered at the Armação, and, supported by the ships, drove back the Government troops there, killing or wounding fifty-six and capturing forty-five officers and men. But at 5 A.M. the Government commander, reinforced by 1000 infantry, again advanced under the fire of guns mounted on Caju Island. Admiral da Gama called up 100 extra seamen from Conceição, and sent the Liberdade and some armed launches close under the shore. Thanks to these measures, he gained ground for a time; but after three hours' hard fighting he recognised that the enemy was too strong for him and withdrew, the Aquidaban, Liberdade, and launches meanwhile keeping the Loyalists in check. The attacking force removed its last man by about 11 A.M., after having spiked all the guns in the Armação, but it lost about 100 killed or wounded. So heavy was the loss in the Liberdade that a newspaper correspondent who was on board, and who was himself hit in the throat, had to take the vessel out of action. This was one of the last serious efforts of the Insurgents, who—oppressed as much by lack of supplies as by their repulse and the apparent indifference of Admiral de Mello, who was still in the South—from that time rapidly lost heart.

Attack on the Armação.

It must have been with much unwillingness, and only under the conviction that some serious effort had to be made to prevent the approach of the Government fleet, that on the morning of February 21st Admiral da Gama sent the Aquidaban once again out of the Bay, which she left without receiving any noticeable damage, although she was thrice struck.

Final departure of the Aquidaban.

In the meantime, on the 18th, the Government armed cruiser Nictheroy (*ex* El Cid) had appeared off the harbour, and had, without interference, landed 300 men outside. It had been intended that she should go in and discharge her dynamite gun at Villegagnon, but as the gun was found to be out of order—perhaps in consequence of treachery—the project had to be abandoned. Her appearance, however, was a significant episode; it showed to the Insurgents in Rio Bay that Admiral de Mello had not been attempting to do what he should have done, *i.e.* to shatter the Government's naval force before concerning himself with the situation in the South. It indicated also to the Peixotists that the sea was open to them; and, as events proved, they were not slow in taking advantage of the fact.

Action of the Government squadron.

From that time forward affairs in the Bay were—save on February 23rd—of an uninteresting and, indeed, unimportant character until March 10th. There was firing as usual, but no great

Final collapse of the rebellion.

damage was done except on February 23rd, when a shell from a gun at Ponto Madame struck the Insurgent armed steamer Venus, blowing her up, smashing her—possibly by the explosion of her magazine—into two pieces, and causing the loss of her captain and twenty-nine men. It was only on March 10th that matters assumed a more definite complexion. On that day the Government vessels Aurora, Nictheroy, and Destroyer dropped anchor in Praia de S. João, just outside the harbour mouth, leaving the Paranahyba and America (*ex* Britannia) cruising in the offing; and on the following day President Peixoto, assured at last of his ability to reduce the rebels, gave notice to the diplomatic body of his intention, at the expiration of forty-eight hours, to begin operations in earnest against the Insurgents, and to open fire on them from all his guns afloat and ashore. It was at first believed that Admiral da Gama would fight, and in consequence most of the inhabitants hurriedly left Rio; but the Government's threat, combined with Marshal Peixoto's obvious superiority of force, the outbreak of yellow fever in the Bay, shortness of provisions and stores, and the fact that the elections, held early in the month, had had the effect of depriving the insurrectionary movement of nearly the whole of its *raison d'être*, put an end to the local conflict without necessitating much further bloodshed. Admiral da Gama, on the 12th, offered to submit on his own terms, and when these were rejected he went, with most of his officers, on board a neutral warship, sent nearly all his men to Enchadas Island, and allowed the Government to open fire on ships that had been already deserted. The one-sided action began at noon on the 13th, and, with intermission, continued until 4 P.M., when, no reply having been made, the Government fleet, consisting of the Aurora, Nictheroy, America, Tiradentes, Paranahyba, Itaipu, Bahia, two steamers and five torpedo-boats, prepared to enter the harbour, where it anchored soon after six o'clock. On the 14th the Insurgent forts and ships were taken possession of without the firing of another shot, and Marshal Peixoto was once more supreme on the water as well as on the land in the Bay of Rio.

WM. LAIRD CLOWES.

CHAPTER XII.

Naval Reinforcements in War Time, and Our Supplementary Resources for Warship-Building.

It has been frequently assumed by writers upon naval subjects, and less often by naval men, that the next struggle for the supremacy of the seas, and all that this means, will be "short, sharp, and decisive." The phrase has its merits and uses; it is expressive, and in the tag of a war correspondent's telegram, or the peroration of an after-dinner speaker, seldom fails to produce a telling effect. The assumption, however, is not to be hastily accepted as correct, or without due consideration of its full meaning. Sharp, in the sense of being violent and painful, we may confidently expect that the conflict will be, and, once begun, it can hardly terminate without being decisive, one way or the other, of the continued existence of the British Empire; but why it should necessarily be of short duration has yet to be explained.

The reasoning which has led many persons to accept as unassailable the assumption that the next war by sea will be short, is in all probability based partly on analogy with recent operations by land, and partly on the development which has taken place since the last great war in all that appertains to the material of naval warfare. The Continental wars of the second half of this century do, indeed, present a notable contrast in this respect to those which have preceded them, while steam as a motive power has removed to a large extent one of the influences which may be supposed to have contributed to the prolongation of the old wars by sea.

Nevertheless, the analogy with land warfare may be pushed too far, and the advantages which steam has conferred in enabling prearranged strategical combinations to be more speedily carried out may be over-estimated. Other factors to be given due consideration are the relative strength and the different aims of the opposed Powers. It cannot be gainsaid that if both parties to the struggle feel sufficiently powerful to act on the offensive without any preliminary re-arrangement of their respective forces, then a decisive battle might

possibly be fought shortly after the declaration of war. But surely it is of the essence of Britain's naval policy to make such a proceeding on the part of her possible enemies extremely hazardous. If the objective of both contending admirals be the battle fleet of his foe, then, indeed, the conditions will be novel, and to find a similar state of affairs we shall have to go back very far in our naval history.

It is not my purpose here to discuss this question, and the above remarks are intended to be merely suggestive, but the bearing of the reply to it upon the subject of this chapter is clear and well-defined. We have, as I shall endeavour to show, immense and unequalled resources at our back—resources which, if properly utilised, must have an enormous effect in determining the result of a war by sea; but time is needed to utilise them to the fullest advantage and extent. That we shall have the time is at least one of the aims which should be kept in view by those who are responsible for the defence of the empire.

"La puissance d'une marine est moins dans son matériel à flot que dans l'outillage des arsenaux et la puissance de production des ses chantiers." Without doubt this oft-quoted sentence of M. Bertin contains a truth, but it does not express the whole truth. The equipment of the arsenals may be all that can be desired, and the capacity of the ship-yards to turn out good work rapidly be indisputable, but if the duration of the struggle be so short as to make it impossible to utilise the one or the other, the nation which does not possess these resources will be on a par with that which does. We are in the position of the latter; but if we are to reap the full benefit of the advantage thus given we must have time to do so, and that time can only be assured provided that at the beginning of a war our superiority in force is beyond dispute.

That the words of M. Bertin have not fallen unheeded on the ears of foreign statesmen a hasty glance at the progress made in this direction shows. When he wrote, the private shipbuilding establishments in France, notwithstanding the bounty system, were neither numerous nor important. Italy, Germany, Russia, and other nations came to this country for many, if not the greater part, of their warships. In the United States the private shipbuilding industry appeared to be languishing to death. But between then and now the outlook has undergone considerable change. Sir Charles Dilke tells us that "nearly all the big orders from neutral powers go to France. La Seyne and La Ciotat on the Mediterranean turn out the finest warships afloat, and this in spite of almost every natural disadvantage. They have no coal, no iron, no wood, and no cheap

labour. Everything has to be imported, including the labour. There is nothing except the marvellous skill of the French designers and artificers, that make neutral Powers send their orders to the Mediterranean rather than to the Tyne." The accuracy of this statement has been challenged, and it certainly presents an exaggerated picture, but that the private ship-yards and engine-factories of our neighbours exhibit many signs of flourishing and vigorous development is not in doubt. So, too, in Germany, the private shipbuilders are assisting materially in the creation of a new navy; while in Italy, Austria, Spain, and even in Russia, we see the Government dockyards and arsenals supplemented by those which are the outcome of commercial energy and enterprise, and which render important aid in the construction of warships and the material required for their equipment. On the other side of the Atlantic the development is still more marked. Whereas in March 1885, the United States had no vessel of war which could have kept the seas for one week against any first-rate naval Power, to-day its navy stands high in importance among those of the maritime world, and this marvellous change is largely due to the efficient assistance rendered by the private firms. Independence of foreign assistance has been the leading principle of the American shipbuilding scheme, and beyond using foreign designs, and procuring specimens of machinery for copying, foreign aid in any shape or form for any portion of the ships and their armament and equipment is entirely prohibited. New ship-yards, gun-making, plate and steel foundries, have been established; and as to the work turned out, we have it, on excellent authority, that it is as good as can be found anywhere.

But, while we do well to take note of this progress and development as evidence that other nations have discovered that Sea Power does not wholly depend upon the strength of the effective fleet, we must not lose sight of the fact that a similar movement has been taking place at home. We have not been standing still, and despite all the efforts of our rivals, assisted and encouraged as they have been by their respective Governments, there is no comparison between the whole of the shipbuilding resources of the maritime countries of the globe and the private shipbuilding establishments of these islands.

It is necessary, perhaps, to quote a few figures in support of this general statement, and I find them in Mr. Pinkney's "Record of the World's Out-put in Ship-Building." Whereas in 1873 the total production of new ships was less than 400,000 tons, and in 1883 the corresponding total had risen to 770,000 tons; last year no less than 709 vessels, aggregating 917,076 tons, were built in British

yards, as compared with an output in continental ship-yards of 96 vessels aggregating 59,568 tons.

The capacity of the British shipbuilding yards for warship construction has been variously estimated. The popular notion, no doubt, is that if only sufficient money were voted, there would be no practical limit to the resources of the country in this respect. But it should be remembered that it is not every shipbuilder, even if he possesses the necessary plant, that can put together any class of warship; and that while the private firms, which are willing to comply with the Admiralty requirements, cannot now complain that the naval authorities do not encourage them to take a share of Government work, such work in the time of peace is not always so profitable that other work can be put on one side for it. Lord Charles Beresford has recently informed us that it has been estimated, after personal inspection and observation at all the public and private yards, that not more than seventy-four large ships can be built at one time. Nothing so extensive as this has yet been attempted. Under the Naval Defence Act, twenty-two battleships and first-class cruisers were simultaneously in hand, and to these may be added twenty smaller cruisers. But a large number of the vessels of that programme were of no great displacement, and as this must always be the case, an estimate which only includes the largest ships is incomplete. The knowledge, however, that in the first three or four years of a war for existence, we could add seventy large ships to our fleet, is not without its satisfactory and even consoling features. The uncertain element is time; but, provided our Navy is on a footing adequate to its duties on the outbreak of a war, we need be under no apprehension on this point.

The estimate of our resources, which is here given, is founded chiefly upon enquiries among the shipbuilders themselves, the managers of nearly all the principal shipbuilding establishments having most courteously replied to my request for information—some of them, unfortunately, too late to allow me to make full use of what they have sent to me ; but, as I have had other means of obtaining what was required, I believe that no firm is omitted from my list. The least that can be said for the estimate is that it is what the shipbuilders consider themselves capable of doing under favourable conditions.

Before dealing with the capacity of the yards, there are some essential considerations to be advanced. For all the larger classes of warships something more is needed than building facilities. The supply of armour, armament and ammunition is limited, and, according to Lord Charles Beresford's estimate, is not sufficient for

more than about seventy large ships. This view of the subject takes in, as I have pointed out, only the battle fleet—that is to say, the ships whose fighting will be decisive of the war. But if the war is prolonged, before this fighting takes place there will be something else to claim attention. Commerce-protectors do not require to be armoured, nor to mount very heavy guns. We may, then, anticipate that even if seventy ships of the larger classes are being built, a fair proportion of lighter cruisers, if there is room for them, can be at once laid down and completed with unexampled rapidity. Herein lies the value of our shipbuilding resources, for the demand for commerce-protectors may be expected in the early days of the war to assume proportions unparalleled in the annals of the world.

The provision of machinery is another consideration, and an equally important one. As the manager of one of our chief ship-yards has pointed out to me, "assuming that other large builders were to undertake the same relative amount of work as ourselves, makers of specialities, such as crank shafting, and small machinery for the various appliances on board, and torpedo fittings, but particularly the makers of the shafting would be stimulated by the demand. It would, of course, mean that they should be so stimulated, as their present capabilities would not overtake all that the builders of engines and ships could do." It is to be presumed that with the experience recently gained in "Making a Fleet," among the preliminary steps toward which the Chief Constructor included "the allocation of orders, so that the actual construction of ships, machinery, and armament may be completed within the stipulated period," this important matter has not escaped attention. Finally, it must not be forgotten that if there was enormous pressure on the shipbuilding resources of the country, the capabilities of the different ship-yards would be limited by the number of men that would be available in the trade as a whole.

Here, however, these considerations have been put on one side, leaving machinery, armour, armament and the personal factor for treatment on another occasion. At present it is simply proposed to bring under review the capacities of each yard, irrespective of these qualifying conditions, and to show the number of ships which could now, or in an emergency, be put upon the stocks at each establishment.

Nor have I in this connection deemed it expedient to go into details with reference to the capacity of the public yards. It is highly probable that in war-time these would be fully employed in completing ships for commission, or in repairing those which had received damage. A rough estimate based on past shipbuilding

operations, and a general acquaintance with the yards, gives, as their capacity, six battleships of the Majestic and Centurion classes, with from six to eight cruisers of the Blake and Edgar classes. Pembroke, Portsmouth, and Chatham are alone capable of undertaking the construction of armour-clads of the dimensions of those recently built, while of the numerous slips very few are adapted for modern battleship or heavy cruiser construction, and a large proportion of the docks could not receive vessels of the heavier classes. It is doubtful if there is more than one dock in all the public establishments into which the Terrible could be floated, supposing she were already in existence.

Quality in contract work must be looked for as well as quantity, but on this point nothing could be more reassuring than the Report of the Ravensworth Committee. Ten years ago this Committee reported that there appeared to be no difference of opinion among the witnesses then examined; the unanimous testimony being that as performed under Admiralty supervision, the work was "excellent and in no way inferior to that turned out in the dockyards." The Committee, while advocating the general extension of building by contract, were careful to advise that regard should be paid to the character and experience of the firms who might submit offers rather than to the apparent economy which might result from the acceptance of an estimate based on an insufficient acquaintance with the requirements which are enacted. As a corollary to this suggestion, the Committee recommended that contractors should be encouraged by a more constant flow of work to provide themselves with the necessary skilled labour and costly plant, "for facilities would thereby be afforded of increasing the naval defence of the Empire at a more rapid rate of progress than has heretofore been the case."

It is interesting and instructive to note in this connection that, whereas in the ten years from 1864 to 1874 only seven firms contracted to build armour-clads for the Navy, and only two firms unarmoured ships, and that in the next ten years only three firms constructed armour-clads and five firms unarmoured vessels; during the last ten years, from 1884 to 1894, ten private firms have constructed armoured ships and fourteen firms have built unarmoured or protected vessels. In this calculation I have not included gunboats or other small craft, and I think that the extended utilisation of our resources in this direction, which is thus shown to have taken place in peace time, cannot fail to have beneficial effect should the nation ever be obliged to appeal to the private shipbuilders for their utmost assistance.

Two complaints from the contractors found expression in the Report of the Ravensworth Committee, one having reference to the incomplete and meagre character of the specifications furnished by the Admiralty, and the other to the nature of the supervision exercised over contract work by the Admiralty overseers. The Committee made recommendations under both these heads, and the former grievance appears to have been remedied in great measure. The latter still exists, and is believed to have an effect in restraining some eligible firms from tendering. The present practice of the Admiralty as to overseering, submission of plans, and carrying out the innumerable details in the vessels, could doubtless be modified in time of war so as to materially reduce the time required for the construction of ships and engines, especially ships, and this without any sacrifice of vital efficiency.

The distribution of raw material, and other natural facilities which exist in certain neighbourhoods, have tended to localise the shipbuilding industry round a few centres. For this reason a larger proportion of the yards are to be found in the Clyde and in the Tyne districts than elsewhere. Government work, however, is by no means confined to the establishments at these places, although, in the case of battleships, the carriage of heavy material to a distance doubtless adds to the cost, and thus tends to limit this work so far as private builders are concerned. It is not my intention to institute a comparison between one yard and another, for, even did I feel myself competent to do so, it would serve no good purpose. The sequence in which the yards are mentioned must not be considered therefore as an indication in my mind of their relative capabilities from either a warship-building, or a commercial point of view. My arrangement is purely geographical. Taking first, those firms which I understand to profess to build armour-clads, I have worked down the east coast and up the west, and then retraced the same course in dealing with the companies which do not appear to wish at present to undertake heavier vessels than cruisers. Finally, I have made brief mention of the firms tendering for small craft, such as the torpedo-boat destroyers.

On the Tyne, the shipbuilding yards, at Elswick and Low Walker, of the firm of Sir Wm. Armstrong, Mitchell & Co., Ltd., have, as is known the world over, a great capacity for armoured ship construction. The firm makes a special feature of warship-building at Elswick, although mercantile work is also carried out; and the output under this head alone last year was over 20,000 tons. But it is probably upon the construction of very fast cruisers that the firm most prides itself, and the Esmeralda and Giovanni Bausan,

built at Low Walker, and the Nueve de Julio and Blanco Encalada * at Elswick, have afforded ample demonstration, with other ships, that this is not without reason. To enumerate all the war-vessels which have been built and engined by this firm would take up more space than I can spare; but among the later vessels supplied to our Navy are the Victoria, Katoomba, Mildura, Wallaroo, Sirius, and Spartan. The Elswick ship-yard is purposely fitted for the construction, equipment, refit, and re-armament of warships, both for the line-of-battle and cruising, and while, for this work, its plant and appurtenances can hardly be equalled, they are nowhere excelled. In an emergency, this firm could undertake the construction of two battleships of the Majestic class, and one Centurion, with simultaneously two Powerfuls and twelve smaller cruisers. These vessels could be handed over in from eighteen to thirty-six months if equipped at Elswick, or from three to six months earlier if to be completed in the public yards. The firm would supply armament for all the vessels, and a large portion of the machinery and armour. During peace time and with private work in hand the capacity of Elswick is equal to about half this amount of work. Since the ill-fated Victoria, no armour-clad for the Royal Navy has been turned out from what has been aptly termed Britain's Supplementary Naval Arsenal.

The Palmer Shipbuilding and Iron Company, Ltd., at Jarrow-on-Tyne, is another firm which makes a speciality of warship-building, manufacturing not only their machinery, but armour up to three inches thick, and part of their armament. Last year, this firm turned out nearly 20,000 tons of mercantile shipping, and can build vessels for commercial purposes capable of carrying cargoes up to 8000 tons and up to 450 feet in length. The Swiftsure and Triumph were built at this yard, and, more recently, the Resolution and Revenge, two of the armour-clads of the Naval Defence Act. Among the cruisers for the Royal Navy launched here are the Orlando and Undaunted, and the Pique, Rainbow, and Retribution. Mr. Price, the manager, has furnished me with a very interesting and complete statement of the capabilities of the establishment, both under ordinary and extraordinary conditions.

Under ordinary conditions, and with other work in hand, the firm could deal with—

One Majestic and two Bonaventures; or Two Centurions and two Bonaventures; or One Powerful and two Bonaventures; or Three Edgars and two Bonaventures; or Three Eclipses and two Bonaventures.	To complete in from $2\frac{1}{2}$ to 3 years.

* This is the new vessel built to replace the armour-clad of the same name which was torpedoed and sunk.

In an emergency, with full power of the yard, but without any modification of Admiralty methods and requirements—

Three Majestics and three Bonaventures; or Four Centurions and three Bonaventures; or Two Powerfuls and four Bonaventures; or Two Powerfuls and three Bonaventures and one Eclipse; or Two Powerfuls and one Edgar; or Five Edgars and three Bonaventures; or Six Eclipses and three Bonaventures; or Nine Bonaventures.	To complete in $3\frac{1}{2}$ years.

I think that it is impossible to study the above statement, by a gentleman whose experience in warship-building in recent years is so large, without feeling that, providing sufficient time is allowed us to obtain the promised results, the maritime supremacy of the Empire can only be hazarded by the culpable blundering of our rulers. We have before us here the productive powers of one yard alone; when multiplied by the number of yards equal to, or nearly equal to, the same amount of work, the result is somewhat startling.

Passing on to the Humber, Messrs. Earle's Shipbuilding and Engineering Company, Ltd., has an established position for warship-building, and although the heaviest vessels as yet supplied to the British Navy from this yard are the Narcissus, Endymion, and St. George, all first-class cruisers, the fact that the Chilian armourclads, Almirante Cochrane and Blanco Encalada, were constructed there attests its capacity to undertake British armour-clads if necessary. In addition to the above-mentioned cruisers, the engines of the Immortalité, Apollo, Andromache, Pearl, Philomel, Charybdis, and other ships, were manufactured by this company. With its present work in hand—in 1892 and 1893 the yard turned out over 15,000 tons of merchant shipping—the firm would undertake to deliver in three years two battleships, or a Majestic and a Powerful, and, simultaneously, two or three cruisers of the Edgar, Eclipse, and Bonaventure classes. In case of emergency nearly double this amount of work could be accomplished.

There is now but one firm of battleship builders remaining on the Thames, Messrs. Samuda's yard, which in its day turned out many men-of-war, having been recently dismantled. The Thames Ironworks and Shipbuilding Company, Ltd., has almost continuously for fifteen years been building ironclads and big cruisers for Government. Specimens of its work are to be seen in the Superb, Benbow, Sanspareil, Blenheim, Grafton, and Theseus. The company would have no difficulty in undertaking a couple of battleships or the same number of the larger cruisers.

Between the Thames and the Clyde there are only two English

firms which undertake the construction of battleships : Messrs. Laird, at Birkenhead, and the Naval Construction and Armaments Company, at Barrow. The former are among the oldest contractors for Government ships and their machinery in the country. As builders of all kinds of men-of-war they are thoroughly conversant with the requirements of the Admiralty. It is not long since they delivered the Royal Oak, one of the Defence Act battleships, and they have recently launched the Ferret and Lynx torpedo-boat destroyers. Last year also two handy, heavily-armoured, and well-protected battleships were finished for the Argentine Government. Messrs. Laird, if otherwise disengaged, could build two armoured battleships of the largest class and one first-class cruiser, in addition to lighter vessels.

The Naval Construction and Armaments Company, though comparatively a young firm, has already done a considerable amount of Government work, turning out the Latona, Melampus, and Naiad, with creditable speed in production. It is now supplying the engines for the Majestic, and building, in addition to three torpedo-boat destroyers, the Powerful, one of the protected cruisers of 14,000 tons displacement. With other steamers building in the yard this firm could undertake two ships of the Majestic, Centurion, or Powerful classes and from four to six cruisers; while, in time of emergency, there are space, plant, and facilities for the construction and machinery equipment of at least double this number.

Crossing to Ireland, there are at Belfast two firms quite capable of doing Government work. Messrs. Workman & Clarke do not wish, I believe, to undertake the construction of armoured ships, their machinery being better adapted for the production of large merchant vessels or second-class cruisers. The Company's two yards are of considerable dimensions, and taken together are equal to a yearly output of 50,000 tons of merchant vessels. Steamers of 8000 tons are launched from thence and provided with the largest engines and boilers, so that it may fairly be assumed that, if called upon in a national emergency for assistance, this firm could do somewhat to add to the effective strength of the Navy.

The firm of Harland & Wolff has built men-of-war, but, as everybody knows, its speciality is magnificent passenger steamers such as the Teutonic and Majestic, of 566 ft. length and 57 ft. beam. This firm also holds the enviable position of having during the last three years launched a heavier tonnage than any other in the world. In 1891, the output was 64,962 tons of 34,650 horse-power; in 1892, 68,612 tons with 33,650 horse-power; and in 1893, 65,660 tons with 41,640 horse-power; the machinery for the

ships being made by the firm. Messrs. Harland & Wolff could undertake to build eight ships, and it is immaterial whether they laid down four Majestics and four Centurions, or four Powerfuls and four Edgars. It seems a pity that this firm should never yet have built an armour-clad, when the experience thus gained might at some future date be invaluable to the nation.

On the Clyde there are four firms experienced in warship building, besides several others that would undertake it if it were likely to prove profitable in peace time, or were it made necessary by the outbreak of a great war. Messrs. Robert Napier & Sons, of Govan, built the Black Prince in 1862. The Audacious, Invincible, Hotspur, Northampton, Australia and Galatea, all armoured ships, came from this yard, and of the Naval Defence vessels, the first-class cruiser Gibraltar. In 1892 they launched six, and last year five vessels. Providing they had no heavy work in hand, they could put two or three Centurions and from three to six cruisers of 7500 or 4500 tons displacement on the stocks simultaneously. They would supply the machinery and contract to furnish the vessels complete in from eighteen months to three years according to the size of the ship.

The Fairfield Shipbuilding and Engineering Company, once known as "Elder's," has also had much experience in Navy work. This firm built the Hydra and Nelson, the Magicienne and Marathon, and other cruisers, besides supplying the machinery for ships of all classes, from the Inflexible down to the Hazard. There are ten or twelve slips at the yard on which vessels of the size and weight of battleships or cruisers could be constructed. Two battleships and two cruisers is probably a low estimate of the Government work this firm could take in hand. The Oregon, Umbria, and Etruria, 500 ft. long, came from this yard, and more recently the Campania and Lucania, 620 ft. in length.

Messrs. James and George Thomson, of Clydebank, during the last ten years have built twelve fast cruisers for the British Navy, and more recently, the Ramillies battleship. They are now building three torpedo-boat destroyers, and the Terrible. No further demonstration can be needed of the capabilities of this capitally-managed yard to comply with all reasonable demands. The firm have also built warships for Spain and Japan, and passenger ships like the New York and Paris, of 11,500 tons and 20,000 horse-power. Last year over 20,000 tons of merchant shipping was put into the water from this yard, which, with the engine works, covers an area of 50 acres. There is also a dock which can accommodate vessels up to 750 feet in length. In ordinary circumstances this experienced firm would undertake to turn out in from two to two and a-half years

two Majestics, two Centurions, and two Powerfuls, with from three to four cruisers; and in an emergency an additional vessel of each class.

The London and Glasgow Engineering and Iron Shipbuilding Company, of Govan, who build at the Middleton shipyard, have at the present time four steamships on the stocks, aggregating 15,500 gross tons. This firm built and engined the cruisers Intrepid, Iphigenia, and Indefatigable, but as yet they have built no battleships. According to the work in progress it is within the capacity of this establishment to construct from four to five ships, including a Majestic or Powerful.

Messrs. Alexander Stevens & Co., shipbuilders and machine manufacturers at Linthouse-Govan, have not yet constructed vessels for war purposes, unless we include in that category the notorious Confederate cruiser Shenandoah. But to the mercantile marine of this and other countries they have contributed 350 ships, mostly steamers, and comprising every variety of type and size in mail, passenger, and cargo steamers. In 1893, the gross tonnage in merchant steamers launched from this yard reached the highest figure of the Clyde. This firm could undertake two ships of either the Majestic, Centurion, or Powerful classes, and in an emergency could simultaneously build two cruisers of either the Eclipse or Bonaventure classes.

Here, then, are twelve firms which would be willing at any time to undertake the construction of battleships. That there are other companies whose yards are fully equipped with the needful plant, and who have, or can procure, skilled labour, is highly probable; but it is a large undertaking to enter into competition with the public yards for this business. The margin of profit does not, I think, reach many figures; and without a reasonable certainty of a steady flow of orders, it may be considered wiser to trust to commercial shipbuilding and repairs for a return on the invested capital. Taking as a basis for our estimate the work that these twelve firms could easily undertake, there could be added to the fleet twenty battleships of the Majestic or Centurion classes within a period which, as measured against those which were covered by the great naval wars, is truly inconsiderable.

How long would it take to build, equip, and complete twenty battleships? This is a natural question to ask, but not easy to answer off-hand. Lord George Hamilton, in presenting the scheme of the Naval Defence Act to the country, expressed his belief that the larger battleships would be finished inside four years, and the smaller in three years. That was in the spring of 1889; the orders and the

contracts were out before the end of the financial year, and all the ten ships were practically complete by the end of the financial year 1893–4. The expectations of the First Lord have therefore been fulfilled. But peace-time and war-time are as wide as the poles asunder. If we can imagine a state of affairs in which there is a relaxation of Admiralty requirements, no difficulties in the provision of material, no strike troubles, and perhaps natural emulation between the competing firms, stimulated by the promise of premiums on celerity of construction, is it such a wild improbability to put the time not only inside four years, but inside three? No shipbuilder who has already constructed a battleship puts it at four years in such circumstances as I have mentioned; generally the estimate is from three to three-and-a-half years, and some put it even lower than this.

Moreover, is it necessary to look forward to the construction of twenty Majestics? Already the trend of professional opinion appears to be toward the building of ships of less displacement, providing that these will equally well answer the requirements of the naval men who are to use them. It is not even as if the vessels laid down in such circumstances would be intended to meet the first brunt of the war; they would, if I look at the matter rightly, be the second line of defence, the reinforcement which would render further exertions on the part of the already half-beaten foe utterly hopeless. In the old days, after a battle between wooden ships, the victors repaired damages on the spot, and were in a few hours ready for further fighting. He is a bold man who will predicate a similar result after the onslaught of modern battleships. It is far more likely that victors, as well as vanquished, will have to repair to their harbours. If, then, the victors can place a fleet of brand new vessels on the scene of action, in relief of their crippled and damaged consorts, surely it would not be absolutely necessary for these new ships to be counterparts of those whose places they took? Smaller battleships take less time to build than their bigger sisters. Does not, then, this brief *résumé* of the capabilities of some of our private yards for armour-clad construction hold out a great promise? I have not counted the cost, but what expenditure in pounds sterling can compare with the loss of an Empire?

If, then, we may with some confidence reckon upon our resources in battleship construction proving a mainstay in the hour of danger, providing we have exercised proper forethought in connection with their utilisation, what is to be said about those which we shall look to for the provision of augmented, and largely augmented, protection for our commerce? Lord George Hamilton calculated that the ships

of the Edgar class would take two-and-a-half years to build and complete, the Bonaventures two years, and the torpedo gunboats eighteen months. Our shipbuilders have already bettered this, and I find a general consensus of opinion that a medium-sized cruiser suitable for commerce protection could be turned out in fifteen months, perhaps in less. It is to be taken into consideration that the number of very powerful commerce-destroyers is limited. As a rule, the commerce-destroyer of the story-books is, like the Russia's Hope, an improvised war vessel. The hounds to pull down this kind of wolf need not great protection, nor very heavy armament. Speed, large coal capacity, long range bow chasers, and sufficient quick-firers to make it hot when once alongside, are the qualities essential, and if the designs of such vessels were in readiness I believe that in little more than a year from the time the order was given we might have eighty such fast cruisers afloat, if armament, ammunition, and crews were not lacking.

In addition to the twelve firms already mentioned, which could provide at least two cruisers apiece, while simultaneously building battleships, there are twenty-eight other shipbuilding companies which, I believe, would guarantee to furnish the balance. On the west coast of Scotland and in the Clyde there are eleven yards, from each of which, during the last few months, a steamer of over 3000 gross tonnage has been launched. This is *primâ facie* evidence of their abilities to build cruisers such as I have referred to, but we need not rely on this alone. Taking these firms alphabetically, there are Messrs. Barclay, Curle & Co., of Whiteinch, represented in the Navy List by the Imogene, and now doing small work for the Admiralty. This firm, therefore, has a knowledge of Admiralty requirements, and could at all times find space for one or two modified Eclipses or Bonaventures, and could also supply the machinery.

Messrs. Caird & Co., of Greenock, are the well-known builders of the splendid passenger ships of the P. & O. Line, including the Victoria, which was turned out in nine months, the Peninsular, Oriental, and Australia. They are now building several ships for this Company, but with the full strength of the yard, I do not think I am wrong in saying that the firm would undertake to build and engine six large cruisers in eighteen months or less.

Messrs. Charles Connell & Co., of Scotstoun, launched last year nine vessels of 20,000 tons gross, and in the previous year twelve vessels of 23,700 tons gross. Some of these were sailing vessels, but others were large steamers, and although I have no information of their having built warships, it would be strange if they could not

turn out two cruisers of any size up to the dimensions of the Blake.

Messrs. Wm. Denny & Sons, at Dumbarton, are large builders of steamers, and machinery makers. They launched last year fifteen vessels aggregating 24,210 tons. Some of the ships which they have built for the Russian Steam Navigation Company are quite capable of being used as auxiliaries in war.

Messrs. D. J. Dunlop & Co., of Port Glasgow, launched last year two 3000 horse-power steamers of large tonnage, and are building two more of 5300 tons. In 1893 also they trebled their output of the previous year. My information is in effect that the yard has capabilities for medium-cruiser construction. The firm are also machinery manufacturers.

Messrs. Gourlay Bros., & Co., of Dundee, although they do not at present see their way to tender for battleships, are ready and able to build cruisers. In addition to the work in hand they could lay down an Edgar and two ships of the Eclipse or Bonaventure class. In an emergency they could more than double this output. They would also supply the machinery, &c., to the ships they built.

Messrs. D. & W. Henderson, of Meadowside, Partick, the builders of the racing yachts Britannia and Valkyrie, launched last year over 10,000 tons gross. I am told that they could build and engine cruisers up to the size of the Blake.

Messrs. A. & J. Inglis, engineers and shipbuilders at Pointhouse, have not built war vessels, but they have supplied the Government with machinery. They have built merchant vessels of all kinds up to 12,000 tons displacement. This firm would, in addition to its ordinary commercial work, undertake the construction of two ships of the Edgar, Eclipse, and Bonaventure classes, and in case of emergency three more cruisers. They are now building some steamers for the British Indian Steam Navigation Co., and a yacht for the Khedive of Egypt.

Messrs. Lobnitz & Co., of Renfrew, turned out thirteen vessels from their yard last year, principally of small tonnage, but they have built large and fast ships. I understand that they are on the Admiralty list and build for foreign Governments, but have no direct information. Messrs. Scott & Co., of Greenock, the builders of the Thrush and other men-of-war, and Messrs. W. B. Thompson, of Dundee, could also build medium-sized cruisers.

On the east coast we have a list of sixteen shipbuilders, beginning with Messrs. Wm. Doxford & Sons, Ltd., of Pallion, Sunderland. This firm has already done Admiralty work, and is now building two torpedo-boat destroyers. They could, in an emergency, build

three cruisers of either the Edgar, Eclipse, or Bonaventure classes and, if necessary, supply machinery for others.

The average output from the yard of Sir Raylton Dixon & Co., at Middlesbrough, for the last three years has been over 30,000 tons, and includes some very large steamers for the merchant marine of this and other countries. For the British Navy they have built the Tourmaline and other unprotected vessels. To build a couple of cruisers would be an easy task for this firm; and that it does not undertake more Government work is probably owing to the fact that commercial shipbuilding pays better.

Messrs. William Gray & Co., shipbuilders of Hartlepool, whose production for two years has been second highest in the world, completed in 1893 eighteen steamers of 50,349 gross register tonnage. In an emergency this firm, which has all the necessary appliances, might certainly be expected to assist in building cruisers.

Messrs. R. & H. Green, Blackwall, and Messrs. G. Rennie & Co., Greenwich, are old Admiralty contractors, and Messrs. R. & W. Hawthorn, Leslie, & Co., Ltd., Hebburn-on-Tyne, have also had practice in building ships of war and their machinery. The last-named firm built the Bellona, and have recently supplied engines for the new torpedo-gunboats Halcyon, Harrier, and Hussar. They are now building a torpedo-boat destroyer. Last year they launched from their yard two 5000-ton steamers of 3000 horse-power. These three companies would have no difficulty in undertaking two cruisers apiece.

Mr. James Laing, Deptford Yard, Sunderland, a firm which celebrated its centenary in 1893, and in that year launched eight merchant ships, aggregating over 25,000 tons gross, is fully capable of Government work. This yard could supply four cruisers, and perhaps more. Messrs. Ramage & Ferguson, Leith, recently built a yacht cruiser for the Siamese Government, and must be included in the list.

Messrs. John Readhead & Sons, of South Shields, only appear in the Navy List with one vessel. But their average output of commercial ships for the last two years has been over 25,000 tons gross. They are also machinery makers, and if called upon in an emergency could be relied on to supply cruisers, complying with all the necessary requirements.

Messrs. Richardson, Duck, & Co., Thonaby, are also large commercial shipbuilders. Their output last year was nearly 25,000 tons gross, and they have exceeded this amount. We might expect at least two cruisers from this large and busy yard.

Messrs. Ropner & Sons, Stockton, last year launched the heaviest

tonnage on the Tees, and were only slightly exceeded by the firm of Sir Raylton Dixon in the two years preceding. It can well be understood why, in times of peace, these firms do not turn their attention to warship-building, with its special requirements; but if we were at war, they could not stand idly by. The same remarks apply to the firm of Messrs. Short Bros., Pallion Reach, Sunderland, who launched steamers of 26,841 gross tonnage last year, to the firm of Messrs. Robert Stephenson & Co., Limited, of Newcastle, locomotive and marine engineers and shipbuilders, whose yard has a capacity for two armour-clads and three heavy cruisers, and to that of the Sunderland Shipbuilding Company. All these firms could supply cruisers, and that of Messrs. Stephenson of the heaviest description.

Messrs. Swan & Hunter, of Wallsend, topped the list of Tyneside shipbuilders in mercantile output in 1893, with ten vessels aggregating 31,088 tons gross. Their works, which cover twenty-three acres, are for shipbuilding alone, and are capable of turning out 40,000 gross register tons of merchant shipping per annum. They would require additional machinery to a slight extent for building battleships, but, finding ample scope for their enterprise at present in commercial shipbuilding, would not be willing to undertake anything heavier than a Bonaventure. In time of emergency they could build a couple of cruisers of the Edgar or Eclipse class.

Messrs. Craig-Taylor & Co., Stockton-on-Tees, Messrs. J. L. Thompson & Sons, North Sands, Sunderland, Messrs. Furness, Withy & Co., Limited, West Hartlepool, and the Tyne Iron Shipbuilding Co., are four firms also turning out large vessels and having slips on which cruisers could be built. These establishments have been surveyed for Government work and approved by the Admiralty.

While this by no means exhausts the list of shipbuilders, sufficient has, I think, been said to show that for both battleships and cruisers we have ample resources to draw upon. For small craft the building facilities appear to be almost unlimited. Twelve firms are now engaged in constructing torpedo-boat destroyers, including, in addition to those mentioned already, the world-renowned firms of Yarrow, Thorneycroft and White, and a shipbuilding company at Paisley, Messrs. Hanna, Donald, & Wilson. Messrs. Doxford write on this subject: "In an emergency we could put at least twenty on the stocks."

An important point to notice in connection with the performance of such an emergency programme as I have sketched, is that, of the firms mentioned as capable of supplying cruisers, a small proportion only have already constructed men-of-war—a very different business

from building cargo-boats. It is not that the necessary plant is lacking, but that experience in using it for the particular purpose we have been considering. Surely, then, in the public interest, steps should be taken to provide this experience by holding out additional inducements to the shipbuilding companies to obtain practice in warship building.

From the earliest period of this country's rise as a Sea Power, the private shipbuilders have shown their readiness to aid the Government when assistance was necessary. There has never been a war in which ships built in the private yards have not played a part, and often a conspicuous one. It is well known, too, that in the days of the old wooden vessels some of the most important improvements and developments in construction, &c., were due to the suggestions of the private shipbuilders.

What is true of that era is true of the present. The men are ready to help, and their capabilities for ship-producing are superior to the power of production of the whole of the rest of the world. So long as the relations between the great private firms engaged in the work of ship-construction and the Admiralty continue to be harmonious, and so long as we continue, properly and continuously, to utilise our unrivalled resources in time of peace, we may rest content that they will not fail us in time of war.

CHAS. N. ROBINSON.

CHAPTER XIII.

ON CONVOY.

THE protection of commerce in time of war is a subject which has for us an extreme importance, but as yet opinion seems quite undetermined as to the best manner of carrying it out. It is known by tradition and story that down to the end of the last great war the recognised way was by giving merchant ships sailing in company an armed escort; but our naval histories tell us very little, except when from time to time they have to chronicle some great disaster. Admiral Colomb's valuable essay, reprinted in his "Essays on Naval Defence," is almost the first attempt to consider the subject from the naval point of view; and even it seems to dwell too much on the legal or underwriters' side of the question. That is, of course, one of primary importance, but it more directly and peculiarly affects the underwriters and the masters of their ships. What more concerns the Admiralty and the Navy is—How, when they undertake to protect a ship or a fleet of ships, can they best perform the task? It is an open question whether this is to be done by convoy, by clearing the seas of enemies, or by some other means. In the hope of helping to find some answer to it, it is proposed here to enter on some examination of the history of convoy, so as to arrive at a decision as to whether the system was or was not advantageous, and if advantageous, what were the limitations to its value. And again, how far it has been affected by the almost radical change which the conditions of commerce have undergone. Protection of commerce.

In the dawn of Western navigation, every ship was in turn, as it served her purpose, a merchant ship, a pirate, or a man-of-war. All merchant ships were capable of defending themselves up to a certain point, and most of them were equally capable of plundering weaker ships, without inquiring too closely into their nationality; while they formed the bulk of the fleets which were levied for the King's service. But as knowledge and skill increased the several branches of the business separated themselves, as in the several trades on shore. It was learnt that a ship specially fitted for war had an advantage over one that carried arms and cargo jointly; and that defence was at once more effectual and cheaper, if made by a ship of war, than by an Merchant ships once also men-of-war.

armed merchantman. It thus very early became the custom for small merchant ships, more especially those trading in the North Sea, to sail together in company with a few ships of war. The enemies to be guarded against were for the most part Dutch pirates of small force, and the show of protection was commonly sufficient.

Convoy in sixteenth and seventeenth centuries.

In the sixteenth century this escorting the trade was called "wafting," and the small ships of war which carried out this duty were called "wafters." But larger ships going on long voyages were not wafted—they carried their own arms, and did their own fighting, honest or dishonest, as the case might be. The story of the ships that, at different times, went with Hawkyns to the West Indies, and forced their trade on the not very unwilling Spaniards, until they were finally destroyed at San Juan de Lua, may be referred to as a familiar proof that to that extent the professions of fighting and of trading by sea had not yet been differentiated. In the next century, however, our ships trading to the Mediterranean habitually sailed with an escort. The Smyrna fleet, or the Levant fleet, was a recognised institution; but the ships composing it were still expected to defend themselves when attacked, the men-of-war being a rallying point and support. The Barbary or Greek pirates were always in readiness to attack any single ship which they did not deem too strong. Occasionally they made mistakes; as when, in 1617, a squadron of five Turkish ships tried to make themselves masters of the Dolphin of London, and were beaten off with great loss; but on the whole against such enemies the advantage of sailing in company was recognised.

Dutch system.

The Dutch followed a similar system, and their Levant trade was carried on by a fleet of well armed ships, sufficient to make a stout defence against even an attack in force, as was shown in the fight off Plymouth in 1652, between a squadron of English ships under Sir George Ayscue, and the Dutch fleet for the Straits under the escort of De Ruyter with some few ships of war. A similar case was the notorious attack on the Smyrna fleet by Sir Robert Holmes, in 1672, when the English men-of-war were unable to obtain any great success against the Dutch merchantmen.

Trade protected in force, 1652. Dutch Mediterranean trade.

But one of the most important instances of a large fleet of merchant ships protected in force by ships of war is that of the Dutch Mediterranean trade in November, 1652. The Dutch merchant ships had been shut up during the summer and autumn by the presence in the North Sea of the victorious Blake. Some 300 were collected within the Texel. Tromp, who, after the defeat of the Kentish Knock, was called to the command, undertook to see them on their way, with a fleet of about seventy ships of war all

told. There was nothing promiscuous about his method. He went to work systematically; brought his fleet to the Downs, and catching Blake at a disadvantage and unprepared, inflicted on him a severe defeat. Blake drew back into the river. Then, and not before, the vast concourse of merchant ships was ordered to go on their way; Tromp, with the men-of-war, lying at anchor on the French coast between Boulogne and Gris Nez, till they had all gone clear, when he slowly followed down Channel as a rearguard. From beginning to end, nothing could be more perfect, theoretically as well as practically, than the whole business as conducted by the intuitive genius of this great commander. His homeward voyage with a fleet of some 300 merchant ships in convoy was not so successful; for though his design was faultless, and the execution brilliant, he was not able, as in the first instance, to take Blake unawares, but was obliged to fight for the safety of his charge, against equal, if not superior forces, the great and indecisive battle off Portland on February 18th, 1653. During the night, Tromp succeeded in passing the English fleet; and, always keeping his ships of war between his convoy and his enemy, now sent the merchantmen ahead, as he had previously stationed them astern. The next two days were spent in a running fight, in which Tromp lost a few of his ships of war and some of the convoy; but, on the whole, succeeded in bringing it home with comparatively little loss, and in preventing anything like a flight and general chase.

Another instance of a convoy protected in force is that of the French merchant fleet, which sailed from St. Martin under the escort of M. L'Etenduère, and was met by Hawke on October 14th, 1747. The force with Hawke was much superior to that with L'Etenduère; but the latter's stout defence secured the safety of the convoy for the time; though, being scattered and unprotected, many of the ships were picked up afterwards. **French fleet, 1747.**

Another and singularly interesting instance is that of the convoy for the West Indies, which sailed from Brest in December, 1781, under the protection of a fleet of nineteen ships of the line, besides frigates, commanded by the Count de Guichen. Kempenfelt, with twelve ships of the line, and instructions that the French escort was of force inferior to his own, was despatched in quest of it, and found it broad off Rochefort on December 12th. It was blowing a gale of wind from the south-east; and as Kempenfelt came towards them from the north, Guichen formed line of battle to leeward of his convoy, between it and the English. Kempenfelt was quick to see and take advantage of the blunder. With his squadron also in line of battle and close to the wind, he passed astern of Guichen's line, **West Indian fleet, 1781.**

the sternmost ships of which received the raking fire of all the twelve, and dashed in among the convoy, sinking some, scattering the rest, and capturing nineteen, which he brought back safely to Spithead. In hauling to the wind in the endeavour to prevent the consequences of their mistake, many of Guichen's ships, with their rigging new, badly set up, and stretched, carried away their masts, and thought themselves fortunate in getting back to Brest. It was not given to every man to catch Guichen napping. Rodney had tried it for a couple of months in 1780, without success; and Kempenfelt's exploit, with such an unequal force and against such an enemy, must be considered one of the most brilliant incidents in our annals. More especially does it illustrate one of the dangers to which convoy was frequently liable, either from the blunder of the officer in command or from the jealousy of the masters of the merchantmen.

George Walker, who commanded an English privateer during the war of the Austrian succession, tells how, on a cruise towards Lisbon in company with two other privateers, he fell in with a fleet of merchantmen which he thought might be French; and noticing that most of them were well to windward of the frigates in charge, ran down to them to see what could be done. On drawing near, however, he discovered them to be English. "Had they been French," he says, "in the position they were in we could have captured as many of them as we chose, without the men-of-war being able to touch us."

Anson's engagement, 1747.

To the three instances already given of the attack on a convoy under relatively strong protection, should be added that of Anson's engagement with La Jonquière off Cape Finisterre on May 3rd, 1747. Anson's action has perhaps some strategic resemblance to Hawke's already mentioned; but the disproportion in Anson's favour was much greater than that in Hawke's; and thus, after crushing the enemy's fighting ships, Anson had still a reserve which succeeded in capturing some important part of the convoy.

Attack on convoy successful when escort insufficient.

But with these exceptions, wherever an attack has been made on a large convoy, the escort has been altogether insufficient. Such was the case in the celebrated capture of our Mediterranean trade, under the escort of Sir George Rooke, in 1693; or the almost more fatal capture of the East and West Indian trade, under the escort of Captain Moutray, in 1780. Both captures were effected a little to the southward of Cape St. Vincent; in both the loss was estimated at upwards of a million sterling; in both, from the vast importance of the trade, it had been accompanied by the grand fleet to what was supposed to be the limit of danger; and in both no care had been taken to obtain any certain intelligence of the enemy's movements or position.

Another historical capture of convoy was that of the St. Eustatius booty coming home in April, 1781, under the escort of two ships of the line and three frigates, commanded by Commodore Hotham. The French, better served than we were at that epoch, had news not only of their approach, but of their intended course, and sent Lamotte Picquet, with a squadron of six sail of the line, two frigates, and two cutters, to look out for them well to the westward. The disparity was so evident that Hotham, on understanding that he was in presence of a French squadron, made the signal for every one to shift for herself. The men-of-war, though chased, got into Berehaven; but the greater part of the convoy—twenty-two ships out of thirty—with the enormous booty, became prize to the enemy.

St. Eustatius convoy, 1781.

No direct losses which we have sustained at sea are at all comparable with these, and they may easily be considered as bearing out the doubt which Admiral Colomb has expressed, whether a system which exposed our commerce to such tremendous risks was not a faulty one; for it is plain that the merchant ships, if at all good sailers, would have been individually very much safer if making their own way, and trusting to the watchfulness of their own masters, than collectively, when thus brought together into a large fleet of such value as to stimulate the enemy to every possible exertion, and left without adequate protection. In 1780, they were left to continue their voyage under the escort of one line-of-battle ship, the Ramillies, then always an unlucky name, and two frigates, when it ought to have been known that the combined fleet of France and Spain was holding the great bight below Cape St. Vincent. In 1693, the ignorance and want of precaution were as reprehensible, but the escort under Rooke was nominally more respectable. It consisted of ten or twelve ships of the line and as many frigates; but then Tourville had with him seventy-five or eighty ships of the line, with from thirty to forty frigates and small craft, which ought to have been known by the Admiralty and the joint admirals. As to Hotham's loss, there must certainly have been traitorous correspondence with the enemy; but then Rodney knew better than anyone else that he was dealing with scoundrels, and ought to have anticipated their action. Stronger escort he could not have given; but in some other way he might have arranged for the safety of the merchandize. The loss was largely his own, and occasioned him great trouble; but letting such a rich prize go to the French was the worst possible way of getting rid of it.

Is convoy best system?

There can be little question that in these, and other instances similar in effect, though not on such a gigantic scale, which Admiral Colomb has adduced, there were grievous blunders; that the enemy's

Losses due to blunders.

gain and the English loss would have been less had the ships attempted to run the voyage by themselves; but it does not, perhaps, necessarily follow that their running by themselves would have been the best thing. It will, of course, occur to every one that if the joint admirals in 1693, or Sir Francis Geary in 1780, had had such intelligence as they ought to have had, and had accompanied the trade past the enemy's fleet, the commercial loss would certainly have been prevented, even if—which there is no reason to suppose—our grand fleet had itself been defeated.

Safety of commerce depends on command of sea.

The deduction, then, seems to be, not so much that the theory of convoy is faulty, as that there were blunders in the employment of it, and that it is essential to success to make the guard in some degree proportionate to the work it may be called on to perform. This consideration seems to have been neglected. Perhaps an even stronger rule might he laid down. Just as no territorial attack can be undertaken without first securing the effective command of the sea, so until that command is secured the safety of commerce cannot be guaranteed. The two seem to stand on exactly the same footing, except, of course, that the ruin and loss of an armed expedition may easily be of far greater national importance than the loss of any number of merchant ships. Now it is established with absolute certainty that a military expedition must not sail unless the enemy's fleet, which might oppose it, is either crushed, blockaded, or contained. But a military expedition while at sea is on exactly the same footing as any other convoy, the difference being that it is commonly much larger, that, instead of merchandize, it carries soldiers, and that the greater importance of the cargo has led to a more careful study of the conditions essential to success. The despatch of a military convoy has been rightly considered an affair of the first importance; and when any danger was to be apprehended, every exertion has been made to secure success. It was so in 1780, when Rodney relieved Gibraltar, crushing the Spanish fleet under Langara on the way. It was so in 1781, when Darby again relieved Gibraltar with a force before which Cordova prudently retired; and still a third time in 1782, when Howe relieved Gibraltar in face of the combined fleet of France and Spain. On the latter occasion the English fleet was, numerically, far inferior to that of the allies, who ought to have endeavoured, at all hazards, to prevent the convoy reaching its destination. That they did not do so was a tacit acknowledgment of their real inferiority; but under a commander less skilful than Howe, or against a more determined enemy, the fleet, the convoy, and the fortress might have been in very great danger. So, too, the large French convoy which carried Bonaparte and his army to Egypt in

1798, with as strong an escort as possible, did—as was known afterwards—run an extreme danger, which it escaped, not by skill or care, but by a mere lucky chance.

In the case of merchant ships, on the other hand, success has been left very much to haphazard. Such a guard has been given as was convenient, and as might, if all went well, satisfy the merchants. That all would go well was, as a rule, rather hoped than provided for. Both in 1693 and in August, 1780, the fundamental error lay in taking a large and rich convoy into the way of the enemy without making sure that the enemy was not in a position to hurt it. This horn-book precaution having been neglected, the loss that befell was a natural consequence, and no blame rested on either Rooke or Moutray, who only obeyed the orders of the Admiralty; though, of course, when it was judged necessary to make an example of some one, in order to turn the wrath of the victims from the Government, it was not difficult to find Moutray guilty of some error in detail, for which he was dismissed his ship. It follows, then, that if we do not hold the command of the sea either locally or absolutely, a convoy should not be sent out without a protecting fleet of sufficient force to engage any possible enemy; and even then—as was illustrated in Kempenfelt's attack on Guichen—the safety is by no means assured.

Convoy never safe without command of the sea.

It might indeed be said that in 1757, when the abortive expedition against Rochefort was escorted to Basque Roads by Hawke with the grand fleet, there was no absolute command of the sea; for only the year before we had been defeated in the Mediterranean, and no victory elsewhere had proved that that defeat was exceptional. It was, however, known that there was no naval force in the west of France, the Brest fleet having gone to North America; and even if it had been in France, the fleet with Hawke was much superior in numbers. It was thus assumed that we had the command of the sea, and that if opportunity should arise Hawke would prove that we had, as indeed he did two years later.

Apparent exception in 1757.

In 1854, when the allied expedition against the Crimea sailed from Varna, it was covered by the English fleet, the French men-of-war, acting for the time as transports, being lumbered up with troops and military stores. Nobody doubted that the English fleet alone was far superior to the Russian, even if it had come out, of which there seemed little likelihood; but nevertheless there was some apprehension that amid such an enormous convoy—numbering upwards of 600 ships of all sizes—a dashing attack by a few heavily armed steamers might do a vast deal of mischief.

Expedition to Crimea.

It will certainly simplify one of the problems of convoy if we can bear in mind that a convoy of merchant ships and a convoy of

"Runners."

troopers are subject to exactly the same strategical laws; and that as a commercial convoy becomes more and more valuable, as it becomes more and more likely to be an object for the enemy's serious attention, so does the protection of it become more and more difficult. On the other hand, ships singly or in small squadrons can often pass as "runners," without protection other than "a clean pair of heels," even through a sea absolutely held by the enemy. Something must, of course, depend on the rigour with which the sea is occupied; but just as we have found it difficult to prevent raiding attacks on our coast—just as, in 1760, Thurot, with a small squadron, was able, after escaping from Dunkirk, to make several captures in the North Sea and in St. Patrick's Channel, and to sack Carrickfergus before he was killed and his ships captured in Ramsay Bay—so it has been shown over and over again to be almost impossible to prevent a certain number of merchant ships passing through the most strictly guarded sea. During the greater part of the wars of the French Revolution and Empire, we had a very absolute control of the western sea, and our squadrons closely blockaded the west coast of France; but we never succeeded in closing the passage to their cruisers and privateers, and a few armed merchant ships, then known as *aventuriers*, used to run in and out with an immunity that their ships of war could not attain. The extreme vigilance which was necessary during the American Civil War to prevent blockade-runners getting into the Confederate ports is a familiar modern instance of the chances always in favour of a runner; and though, in course of time, the Federals did succeed in making blockade-running excessively difficult, they could not absolutely stop it until they obtained possession of the whole coast line. No such blockade-running would have been possible in favour of Russia during the war of 1854–5, because the formation of the Russian coast, and the narrow waters of the Baltic, render the blockading of them easy in comparison with that of the long and intricate coast of the Southern States fronting the Ocean or the Gulf of Mexico.

Advantage of cruiser over merchant ship.

It may thus be assumed that the extinction of commerce on the open sea is a task of considerable difficulty even for uncontrolled sea-power. But any sea-power, controlled or not, may do much harm by privateers or cruisers. A ship fitted as a cruiser has a distinct advantage over any cargo-carrying merchant ship, except perhaps in respect of speed. To be also a fighting ship would entail an expense for guns and men which would materially increase the cost of the voyage. To some extent, no doubt, our larger steamers will be able to defend themselves; but the limit of that ability will probably be

small in the future as it always was in the past No English merchant ships have ever been so well armed or so well manned as the old East Indiamen ; and yet the Kent was taken in fair fight, and without any great difficulty, by the Confiance, an 18-gun privateer. The Kent had eleven killed and forty-four wounded ; the loss of the Confiance was sixteen wounded, of whom three died. That, in 1810, two 44-gun frigates, Bellone and Minerve, commanded by such able men as Duperré and Pierre Bouvet, with the Victor, 20-gun corvette, in company, should take two out of three Indiamen is not to be wondered at, although the merchant ships, each mounting 30 guns and with a crew of 110 men, had also 250 soldiers on board, and made a stout resistance.

Lessons from Indian trade.

Compared with her consorts, the Victor was of small force ; but three years before, as the Revenant, commanded by the celebrated Surcouf, she had been for many months the scourge of the English trade in the Bay of Bengal, and, together with the frigate Piémontaise, had compelled the merchants of Calcutta to reconsider their views on the subject of convoy. They had for some time inclined to the opinion, referred to by Admiral Colomb, that a good ship well commanded, sailing by herself, running the risk by herself, might have a better chance than in a large and extremely valuable convoy. In the case of a doubtful or disputed command this appears to be quite true, unless the Admiralty is prepared to protect the convoy in force ; but where the command of the sea is held, where there is no danger to a merchant ship except from a privateer or adventurous cruiser, there is absolutely no danger at all to an orderly, well conducted convoy, under efficient protection ; whilst to a "runner" there is a certain amount of risk, proportionate to the number, boldness, and skill of the enemy's privateers. It happened in 1807 that this risk in the Bay of Bengal was unusually great. Several privateers, and notably Surcouf in the Revenant, had established themselves there, and with them was the Piémontaise, a 46-gun frigate, commanded by Captain Épron. The Calcutta merchants and underwriters had lost heavily and were very angry. Sir Edward Pellew, they complained, lay at Madras doing nothing, while these ships commanded the bay. The sums paid by the insurance offices in Calcutta alone for losses during September and October amounted to close on 300,000*l*. However, in the beginning of 1808, both the Revenant and Piémontaise returned to Mauritius, and there the Revenant was taken into the Government service. The Piémontaise, after refitting, came back to the Bay of Bengal, and on the 8th of March was captured by the San Fiorenzo, after a stout defence and an action that had lasted over three days.

Efficiency of convoy.

No other men showed themselves competent to play the same game as Surcouf and Épron, or at any rate with the same success and immunity. Captain Mahan has, however, shown conclusively that their success was entirely due to the refusal or neglect of the Calcutta merchants to avail themselves of the protection provided by Pellew. They differed from him as to the method. Ignoring the special conditions of the sea, they thought that "runners" stood a better chance than convoy, and they paid the penalty, at a time when insurance had fallen to 3 per cent., if sailing with convoy, and the losses by capture amounted to but 1 per cent. on the property insured. It may be taken as a singularly striking instance of the advantageous working of that principle which Captain Mahan has happily called "the concentration of effort," which he thus applies equally to the protection of commerce and to the attack on the enemy. In seas which we held in such strength as to render it impossible for any considerable force to appear against us, there can be no doubt that protection afforded by convoy was effectual and economical.

Interfered with by misconduct of merchant ships.

There was, however, one thing which sadly interfered with its efficiency—the very general misconduct of the masters of the merchant ships. These were bound by the terms of their insurance, and by the instructions of their owners as well as of the Admiralty, strictly to obey such orders as they received from the commander of the escort. As disobedience caused, if they were captured, a certain loss of the insurance, it might have been supposed that they would be most careful to risk nothing; but it was not so; and whether from the pride of being well to windward, or impatience at the slow sailing of the dummies of the fleet, or from a desire to push on and get the first of the market, those who commanded the fastest ships habitually straggled, or, if it seemed convenient, altogether parted company. Mention has already been made of Walker's observation regarding the ships of a convoy straggling to windward of their escort. He pointed it out to the commanding officer, Captain Craven, who answered, "Let me do all I can, these masters of common vessels who sail better than the rest will keep to windward; for as to firing at them, I have done it till I am tired, and may fire away every shot in the ship."

Instances.

It is difficult to get particular instances of this kind of thing; for if the disobedient ships got safe in, or if being captured the insurance was paid, there was probably nothing more said about it, whilst if they were captured and the insurance was withheld, either a guilty conscience accepted the decision, or the story of it has to be found in the records of our law courts. The notices of such misconduct in

the Admiralty records are very few and for the most part couched in vague and general terms.

Here, however, is one which is unusually explicit, and is the more interesting as the experience of a man whose name holds a very high place in our history—Sir William Cornwallis. It is a letter to the Admiralty written from Spithead on the 21st of November, 1776, giving an account of his voyage home from Jamaica in charge of a convoy.

Cornwallis's experiences, 1776.

"I shall enclose by the next post another copy of the Trade that left Jamaica under convoy of His Majesty's ship Pallas under my command, wherein I have set off the time of their parting against the names of such as we knew, but they chiefly parted in the night; I hope their Lordships will be pleased to consider that it was totally impossible for the officers of a man-of-war to tell the names of all the merchant ships, particularly as there were not above eight or ten out of above a hundred sail that kept their stations or behaved tolerably well. During the time the Maidstone was in company I wrote to Captain Gardner to beg that he would oblige the ships in the rear to pay attention to my signals; notwithstanding which, when we were off Cape Antonio, between 20 to 30 sail brought to to buy turtle, the Maidstone being at that time in chase. When she came up, the masters of the merchant ships acquainted Captain Gardner that their passengers were on shore purchasing turtle, and they could not make sail. This Captain Gardner informed me of before he parted company, and that many of them gave him impertinent answers when he hailed them, and that it was impossible for him to make them attend their duty. After we got through the Gulf and the Maidstone had parted company, in the evening it was squally, with thunder and lightning. We close-reefed our topsails, and they were lowered down, so that the worst sailing ship in the convoy might have kept her station, as the Pallas sailed very ill. We steered during the night the same course that we had done several hours before it was dark, with the wind aft. In the morning there were not above fifty sail to be counted from the masthead, and not above ten in their stations, the rest being an amazing distance to the eastward of us, and upon our starboard beam and bow; upon which, as I had a great desire to preserve the convoy, I altered my course and steered after them, though I apprehend it to be the duty of the convoy to steer after the man-of-war, not she after the convoy. Many of the masters of the merchant ships acquainted the officers of the Pallas that they thought it entirely owing to our steering so much to the eastward after those ships that we met with the calms which occasioned the long passage. From this time to the 24th September,

the weather was such that any ship might have kept company that chose; that morning there were only nineteen sail in company; during the day it blew very hard, and we brought to under a reefed mainsail; the next morning there were only six sail in sight, which joined us. The Suffolk parted company the 27th by request; the Anne, Northside Planter, Hereford and London hoisted their colours in the morning of the 30th and parted company, steering a different course; the Alexander kept company till the evening, when we retook the Anne; she then hailed us and desired to part company. I told them we had just retaken a ship, and that there were a number of American privateers about, upon which he said he would keep company; but left us in the night. I believe the masters of the ships thought their only danger was in going through the Gulf, and that if we had not altered our course and steered after them, none of those that were at a distance would have joined us again. I was informed by one of the masters of the ships that the Sarah and Elizabeth, Foote [master], one of the ships that parted as soon as we were through the Gulf, hoisted his colours, which occasioned some of the other ships to go away with him; but he was at such a distance I could not see him."

Cornwallis's second experience, 1779.

On Cornwallis's return, the merchants, in the first instance, preferred a complaint against him for leaving the convoy. Several letters passed, and they announced their intention of demanding an inquiry; but on reading Cornwallis's statement, they declared themselves satisfied, and, as far as he was concerned, the matter dropped. Of their further action in respect of the offending masters we have no account; but they do not seem to have effected any improvement. Within three years, having just gone out again to the West Indies in command of the Lion—in which, it will be remembered, he took a very distinguished part in Byron's action at Grenada—Cornwallis wrote from St. Lucia on the 3rd April, 1779:—

"On the passage out with the West India convoy, on 5th February, finding them much dispersed, I made the signal for the Deal Castle to keep them within their limits. Captain Parker reported to me that many of them absolutely refused to obey his orders, particularly Jesse Curling, master of the ship Landovery, bound to Jamaica, who was exceedingly insolent and abusive to Captain Parker, and told him that he would not bear down for him, and that no man in England should make him. I hope their Lordships will be pleased to take notice of this matter, as it appears to be very hard that an officer should be insulted by the very people whom he is employed to protect. It was particularly so in the case of Captain Parker, as he was extremely attentive in keeping the convoy together, and I

think it was greatly owing to his assiduity that we were able to carry them all safe to Barbadoes. The Parnassus, Captain Carr, and some few others, behaved very well; but I cannot say that the masters of the West India ships are much improved since I had the honour of conducting them last."

It may easily be supposed that this persistent disobedience and irregularity was frequently the cause of loss. A large convoy from —say—the West Indies to England, under the escort of probably a dull sailing 64-gun ship and two not very crack frigates of small force, pursued their voyage girt round with a cordon of the enemy's privateers, who did occasionally succeed in snatching a prize out of the very heart of the fleet. Sometimes, too, the escort was merely nominal, and the principal use of the convoy was to collect a number of merchant ships together, for the convenience of the enemy; as in 1758, when the Winchelsea, a 20-gun frigate, was sent out in charge of the Carolina trade. The Winchelsea was captured, and thirty-four of the convoy also; the rest escaped. But in the same year, 1758, the West India trade and a considerable number of transports carrying soldiers went out without let or hindrance, under the escort of a squadron of eight ships of the line, two of 50 guns and two frigates. It was merely a question of degree. But it cannot be said that the system of convoy was at fault, because a 20-gun frigate, armed presumably with 6-pounders, was unable to defend a large convoy, or even herself. On the other hand, it not unfrequently happened that the escort sacrificed itself in defence of the convoy, and in doing so enabled the convoy to escape. The singularly obstinate and clever defence of the Nightingale, in 1707, against six French galleys under M. de Langeron, has often been related; so also the very determined defence of the Serapis against the Bon-Homme Richard, which, though the Serapis, as well as her consort, the Countess of Scarborough, was captured, did protect and preserve the whole Baltic trade.

Uselessness of nominal escort.

On the whole, it appears that the efficient protection of convoy by the dominant sea power is a question of means and expense. But the covering force must be strong, in proportion to the probable strength of whatever attack is to be expected. If the convoy is large, rich, or important from a military point of view, it may be supposed that the enemy will strain every resource to capture or to stop it, and provision must be made accordingly. Almost every marked disaster to convoy has arisen from a neglect of this very evident precaution; though, of course, it has sometimes happened that a convoy under a reasonably strong escort has accidentally fallen in with a very superior force of the enemy. It must, however, be accepted that with

Protection by convoy for dominant sea power a question of expense.

command of the sea more or less perfect, and with due care, foresight and precaution, commerce can be made fairly safe by a system of convoy. This is proved by the statistics of the English losses during the last Great War, which, as calculated from different data by Captain Mahan, show that the loss by the enemy was about two and a half per cent., or nearly the same as that by the ordinary risks of navigation.

But we know very well that the system of convoy, though theoretically well planned, was, in practice, often very crude and imperfect. The strain on our resources was extremely severe, and, beyond question, they were often found wanting. In addition to which, the convoy service was by no means a popular one. The experiences of Cornwallis, as related above, partly explain the reason; but even when such a reason was wanting, the service was one involving a great deal of hard work, no particular opportunity for distinction and none for prize money, the duty to shun danger rather than to look for it, and the certainty of blame if anything went wrong. So many of Marryat's stories are known to be founded on fact, so many of his characters are known to have been recognizable as only slightly caricatured, that it is very possible his description of Captain Horton's conduct of the convoy may be taken as an account, more or less exaggerated, of something that actually happened, or could be supposed to have happened.

Change owing to steam.

Now that our merchant ships are much larger than they were in the beginning of the century, when their average size was 125 tons, a convoy would be very much smaller in point of numbers than ever before. If, as is supposed to be most probable, all sailing ships were laid up on the outbreak of war, and the ships to be convoyed were all "slow steamers"—steamers, that is, of eight or ten knots—the difficulty formerly arising from inequality of speed could be easily got over; and as the masters of the ships are also, as a rule, men of better education and more intelligence, it may be expected that they would be more amenable to the necessary restraint when sailing in company. It is thus very certain that a convoy, adequately protected, could in a modern war do all that convoy ever could do, and probably more.

Will convoy be revived?

It is however very generally doubted whether under any circumstances the system of convoy would be revived. To some extent this may be true. It may be admitted that our fast steamers would not be likely to accept any such system. With their great speed and the not inconsiderable armament that they may carry, the war risks would not be heavy. But the eight or ten knots steamers are not the stuff that fortunate runners are made of; and that for them convoy

in some form or other will be revived seems tolerably certain, though probably not in the form known in the last century, or in the Great War. Independent of other changes, the ability to keep an appointed station or an appointed route, without any important divergence, must be taken into account. It seems to offer facilities for guarding the seas with a thoroughness that has never previously been attempted. Admiral Colomb appears to think that commercial opinion will be against a revival of convoy proper. It may be so; but, as a matter of fact, commercial opinion will be at the dictation of the underwriters, and that of the underwriters will be very much guided by the Admiralty. Whatever regulations for the safe conduct of vessels they insist on in the terms of the insurance, must be adopted; and thus, it is very possible that, in some cases, convoy proper may be insisted on. For sailing ships, certainly it will be, if in the course of the war they again creep out of port.

Protection by patrol in ocean;

Geographical position will however have something to do with it; and it may be that in some cases it will be considered more safe and more economical to patrol assigned routes by cruisers of the smaller classes, with places of rendezvous also assigned, to meet their supports in the shape of larger cruisers, or third-class battleships, or any greater force deemed necessary. It is conceivable that the limits of such routes or the positions of such rendezvous might be constantly changing, according to a table which it would not be difficult to make out. Thus, for instance, it might be ordered that all ships running down the coast of Portugal should on each different day of the week be on a different meridian; that a depôt ship off Cape Finisterre should be similarly in a different but definite position; and so for one off Cape St. Vincent. From the one depôt ship to the other is a distance of from 350 to 400 miles, which at discretion could be shortened by an intermediate ship of appropriate force; and between these, any sufficient number of third-class cruisers or other small craft, available either to patrol the whole route, or to take charge of a small convoy from one depôt to the other, according to the judgment of, or intelligence received by, the senior officer.

in Mediterranean.

Again in the Mediterranean, in the case of a war with France, the north coast of Africa as far as Tunis being hostile, the route from Gibraltar to Malta could be held and patrolled by such force as the circumstances required. If the enemy should be strong in the Mediterranean, and if the command of the sea should be vigorously disputed, it is doubtful if, under the geographical conditions, efficient protection could be given; in which case English trade would be very shy of entering the Straits; but if, by superior numbers, or after

a successful battle, the command was assured to England, the bulk of the enemy's force would be shut up in Toulon, Biserta, or elsewhere. Its power of offence would be limited to the raiding action of cruisers, which, if driven off the protected route, possibly damaged in encounter with the guard of the route, would have to get back into their sheltering harbour through or by eluding the blockading squadron. It is not by any means certain that they would be able to undertake a second cruise under the enemy's flag. Clearly, however, in all this, the method can only be vaguely indicated; the details would vary, and have to be varied with every change in the conditions, and must necessarily be at the discretion of the commander-in-chief. We may not rely too implicitly on the observance of the Declaration of Paris by the countrymen of Gabriel Charmes, or by the pupils of the *Jeune École;* but three or four of the large armoured cruisers—Northumberland, Minotaur, Achilles; or of the older battleships—Hercules, Sultan, Audacious; or of Lord Charles Beresford's proposed third-class ships, if they come into existence, with the spaces between them filled in with small cruisers or gunboats, ought to make short work of any possible enemy, national ship or privateer; the English merchant ships either running by themselves along the protected route, or convoyed along it from one depôt to the next, as a London policeman may be daily seen convoying a bevy of lone females from pavement to refuge, and from refuge to pavement.

Protection by small cruisers in Channel.

All this is little more than a modification and extension of the proposal of Mr. Gower in 1811, for the protection of the Channel, which, as quoted by Admiral Colomb, was "to patrol the Channel by a chain of cruisers, connected with the land by a chain of signal-posts. The cruisers were to ply between the posts, communicating with them and with each other, so that any attempted breach along the line would quickly be met by a concentration from both ends of it, and no part would be unsupported." There is little reason to doubt that some such scheme in the Channel would be of great advantage; but, judging by former experience, it may be laid down as a first principle that the protection of the Channel will have to be specially provided for, not by convoy, which indeed was scarcely attempted in former times, but by a cloud of cruisers so numerous as to render it impossible for any prize to be made without being seen.

All our former experience tells of the extreme danger to merchant ships between the Isle of Wight and the Nore. Small craft, which might pass as fishing-boats if overhauled by an English cruiser, and even row-boats, coming alongside a merchant ship in the dark or a fog, and throwing a number of men unexpectedly on board, did make an

enormous number of prizes in the narrow waters on each side of the Straits of Dover. Here, again, the stories told by Marryat may be referred to as familiar to every Englishman, stories which Marryat would not have ventured to tell, had they not had in them an element of known probability; and indeed, without departing from the domain of fiction, we have a story of exactly the same character, though with more grotesque exaggeration, by that most amusing of novelists, Pigault-Lebrun. According to this, "Mon Oncle Thomas," described as a man of extraordinary strength of body and force of character built on the lines of the Jean Bart of tradition, charters a row-boat at Calais, fills it with a score or so of outcasts of the public-houses, goes out to sea, and captures an English 36-gun frigate. That the story is founded on fact, with the important difference of the 36-gun frigate being a merchant ship, may be accepted as probable. That in any future war we should have to be on our guard against such attacks, not only from the lawful torpedo-boats, but from row-boats, fishing-smacks, river or coasting steamers, almost in countless numbers, is pretty nearly certain. A mere patrol, such as Mr. Gower suggested, would be insufficient; we should have to dot the sea with gun-bearing vessels. But numbers, not strength, is what is wanted. A few "Beresfords," a few of the smallest cruisers and gunboats, a fair number of torpedo-boat destroyers, or of torpedo-boats—their torpedoes left on shore—and a large number of small steamers from the river, from the Sussex harbours, or from Portsmouth—anything that will carry a quick-firing 3-pounder,—some such boats, keeping in sight of each other and of everything that goes on between, would be an ideal defence. Still, night and fog are always in favour of the assailants, and it would be practically impossible to avoid some—perhaps even many—losses. But beyond the Channel, there is every reason to suppose that a system of commanding certain appointed stations in force, and a wise prevision of probabilities, will so greatly reduce the opportunities of an enemy's cruisers, that the need for escort or convoy will but seldom occur, and then only in a very modified degree.

T. K. LAUGHTON.

PART II.

BRITISH AND FOREIGN ARMOURED AND UNARMOURED SHIPS.

PART II.

ALPHABETICAL LIST OF BRITISH AND FOREIGN ARMOURED AND UNARMOURED SHIPS.

The list of ships of the British Navy has been compiled from various sources. The official *Navy List* has been the principal guide, and the list is also in accordance with the Navy Estimates for 1894–95. The displacement and indicated horse-power have generally been given as stated in the *Navy List*. The figures under the head of coal endurance, giving the radius of action at ten knots speed, have been criticised. They have been computed from the quantity of fuel that can be carried in the bunkers, without making allowance for the consumption of auxiliary engines, and are based upon performances, or estimates of performances, under the most favourable conditions of weather and the ship's bottom. The figures, therefore, do not pretend to represent the actual coal endurance. It would have been possible to give fairly reliable figures obtained from an actual trial for certain ships, but, with the view of maintaining uniformity, the old arrangement has been adhered to. Mr. Riley's valuable paper, which would enable calculations of the actual coal endurance to be made for certain ships, has been printed in the Appendix.

The principal dimensions and other details of the foreign ships have been in most cases extracted from the Austrian *Marine-Almanach*, and from the *Aide Memoire de l'Officier de Marine*, from the Navy Estimates submitted to the several national Parliaments, and from other public official documents.

There being now no uniform system of classifying the ships of all nations, an attempt has been made to assimilate as far as possible the classification of foreign fleets to that adopted in the British *Navy List*. Occasionally this has been only approximately practicable. It will be observed that the distinction between the smaller gun-*vessels* and the sea-going gun-*boats* is not always apparent, and the former term, applied by some nations to craft to which we apply the latter, has, for special reasons, been preserved.

The designation of foreign guns as a general rule by *centimètres* of calibre will permit easy reference to the Tables of Ordnance of the several Powers in Part III. of this volume.

In general, it may be stated that, as every nation is engaged in either replacing its naval ordnance with new and improved pieces or in rearranging the armament of individual ships, it has been only

possible to republish the latest accessible information on the subject. The quick-firing machine gun and torpedo armaments of every fleet vary continually.

To prevent confusion the vessels commonly known as Torpedo Catchers are named in these lists First Class or Torpedo Gunboats. In the British Official *Navy Lists* they are called First Class Gunboats, and in French Lists are known as Aviso Torpilleurs.

Torpedo-boats of all classes below Torpedo Gunboats have this year been placed in a separate list.

Troop and Storeships, Armed Tugs, Special Service Vessels, Training Ships, Surveying Ships, and Harbour Service Ships are not included in these lists.

The ships of those Powers whose navies are of small importance will be found at the end of Part II., instead of in their former position in the Alphabetical List.

The sketches of the ships are all drawn on the same scale (except in a few cases specially indicated), so that their relative sizes are apparent by inspection.

ABBREVIATIONS.

The following abbreviations are used throughout the Alphabetical List, occurring mainly in the first column, showing the class of ship, and in the armour column:—

a.c.	Armoured cruiser.
a.g.b.	Armoured gunboat.
b.	Barbette ship.
br.	Broadside ship.
c.b.	Central-battery ship.
c.d.s.	Coast-defence ship.
comp.	Composite-built hull.
comp. (in armour column).	Compound or steel-faced armour.
c.t.	Conning-tower.
corv.	Corvette.
cr.	Cruiser.
d.v.	Despatch vessel.
g.b.	Gunboat.
g.v.	Gun-vessel.
2 s.	Twin screw.
t.	Turret-ship.
Tor. boat des.	Torpedo-boat destroyer.
to.cr.	Torpedo-cruiser.
to.g.b.	Torpedo-gunboat.
to.r.	Torpedo-ram.

P. Deck protected throughout.
pp. Partial deck protected.
} The thickness of the deck protection in inches is given under the letters P or *pp*.

Armament abbreviations. As breech-loading rifled guns are now the most numerous in all fleets, it must be understood that all guns are of that description, unless it be otherwise indicated.

l.	Light guns under 15 cwt., including boats' guns.
M.L.R.	Muzzle-loading rifled guns.
M.	Machine guns.
Q.F.	Quick or rapid-firing guns.
f. tu. or b. tu.	Fixed or bow tube for discharging Fish Torpedoes.
sub.	Submerged tube for do.
l. car.	Launching carriage for Fish Torpedoes.

GREAT BRITAIN.—Armoured Ships.

Class.	NAME.	Displacement.	Indicated Horse-Power.	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Completion.	Cost. Hull.	Cost. Machinery.	Armour. Side.	Armour. Bulkhead.	Armour. Turret, or Barbette	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
a.c. 1st cl.	Achilles (iron)	9820	4000	380 0	58 3½	27 3	Chatham	Penn	1864	375,429	69,117	4½	4½	..	18 to 10	14 12-ton M.L.R., 2 6-in. 5-ton, 8 3-pdr. Q.F., 16 M., 2 l.	..	12·7	750	2500
t. 2nd c.	Agamemnon 2 s. (iron)	8660	4500	280 0	66 0	24 0	Chatham	Penn	1883	402,295	101,770	18 & 15	16½ & 13½	16 & 14	18 to 9 3"	4 38-ton M.L.R., 2 6-in., 6 6-pdr. Q.F., 8 3-pdr. do., 5 M., 2 l.	2 l. car.	12·1	960	4100
a.c. 1st cl.	Agincourt (iron)	10,690	4000	400 0	59 5	27 9	Birkenh'd	Maudslay	1868	381,700	83,777	5½	4½	..	10	17 12-ton M.L.R., 17 M., 5 l.	2 l. car.	12·0	750	1300
t. 2nd c.	Ajax (iron) 2 s.	8660	4500	280 0	66 0	24 0	Pembroke	Penn	1883	411,622	106,735	18 & 15	16	16	18 to 9 2"	4 38-ton M.L.R., 2 6-in. 6 6-pdr. Q.F., 8 3-pdr. do., 5 M., 2 l.	2 l. car.	12·1	960	4100
c.b. 2nd c.	Alexandra . 2 s. (iron)	9490	7000	325 0	63 8	26 6	Chatham	Humphrys	1877	394,263	120,061	12 to 6	8 to 5	..	12 & 10 1½"–1"	8 18-ton M.L.R., 4 22 ton, 6 4-in., 4 6-pdr. Q.F., 6 3-pdr. do., 13 M., 3 l.	4 l. car.	14·3	680	2700
b. 1st cl	Anson (steel) 2 s.	10,600	F. D. 11,500	330 0	68 6	27 3	Pembroke	Humphrys	1889	x and y 724,765		18 comp.	16 comp.	14 to 12 comp.	10 to 15 3"–2½"	4 67-ton, 6 6-in., 12 6-pr. Q.F., 10 3-pr. do., 7 M., 2 l.	1 f. tu., 4 l. car.	16·9	1200	7100
c.b. 3rd c.	Audacious . 2 s. (iron and zinc sheathed)	6010	3300	280 0	54 0	23 8	Glasgow	Ravenhill	1869	193,863	52,619	8 to 6	5	..	10	10 12-ton M.L.R., 8 4-in., 4 6-pdr. Q.F., 6 3-pr. do., 6 M., 3 l.	4 l. car.	11·6	500	1260
a.c. 1st cl.	Aurora (steel) 2 s.	5600	8500	300 0	56 0	22 6	Pembroke	J. & G. Thomson	1889	x 220,550	y 64,000	10 comp.	16 comp.	12 conning tower.	6 3"–2"	2 22-ton, 10 6-in., 6 6-pdr. Q.F., 10 3-pr. do., 6 M., 3 l.	2 l. car.	18·1	900	8000
a.c. 1st cl.	Australia . 2 s. (steel)	5600	8500	300 0	56 0	22 6	Glasgow	Napier	1888	195,390	63,000	10 comp.	16 comp.	12 conning tower.	6 3"–2"	2 22-ton, 10 6-in. 6 6-pdr. Q.F., 10 3-pr. do., 6 M., 3 l.	4 l. car.	18·1	900	8000
b. 1st cl.	Barfleur (steel) 2 s. (Copper sheathed.)	10,500	13,163	360 0	70 0	25 6	Chatham	Greenock Foundry	Bldg. Ld. 1892	Total. 599,089		12 comp. 4 nickel steel above	.. 12 comp.	9	.. 2½"–2"	4 29-ton, 10 4·7-in. Q.F., 8 6-pdr., 9 3-pr. do., 7 M., 2 l.	7 f. tu. (2 sub.)	18·5 (17·54) by log.	1240	5180
c.d.s. c.b.	Belleisle (iron) 2 s.	4870	2600	245 0	52 0	21 0	Poplar	Maudslay	1878	240,000 (purchased)		12,10, 8,6	9,6,5	9 conning tower.	16 & 9 3"–1"	4 25-ton M.L.R., 6 6-pdr. Q.F., 9 M., 2 l.	2 l. car.	11·9	510	1824
c.b. 3rd c.	Bellerophon (iron)	7550	4000	300 0	56 1	26 7	Chatham	Penn	1866	235,738	86,963	6	5 8 pilot tower.	..	10	10 8-in., 4 6-in., 6 4-in., 4 6-pdr. Q.F., 12 M., 4 l.	2 l. car.	12·4	650	1610
b. 1st cl.	Benbow (steel) 2 s.	10,600	11,500	330 0	68 6	27 3	Blackwall	Maudslay	1888	x 650,820	y 110,000	18 comp.	16 comp.	14 & 12 comp.	12 to 15 3"–2½"	2 111-ton, 10 6-in., 8 6-pdr. Q.F., 10 3-pr. do., 7 M., 2 l.	1 f. tu. 4 l. car.	16·75	1200	7100
a.c. 1st cl	Black Prince . (iron)	9210	4000	380 2	58 4	26 10	Glasgow	Penn	1862	283,154	74,482	4½	4½	..	18 to 10	4 9-ton M.L.R., 22 6½-ton do., 2 6-in., 4 3-pdr. Q.F., 7 M., 8 l.	2 l. car.	12·7	750	1080
b. 1st cl.	Camperdown 2 s. (steel)	10,600	11,500	330 0	68 6	27 3	Portsm'th	Maudslay	1889	x and y 769,456		18 comp.	16 comp.	12 to 14 comp.	10 to 15 3"–2½"	4 67-ton, 6 6-in., 12 6-pdr. Q.F., 10 3-pr. do., 7 M., 2 l.	4 l. car.	16·9	1200	7100
b. 1st cl.	Centurion 2 s. (steel, copper sheathed)	10,500	13,214	360 0	70 0	25 6	Portsm'th	Greenock Foundry	1893	Total. 608,098		12 comp. 4 above	12 comp.	9 comp.	.. 2½"–2"	4 29-ton, 10 4·7-in. Q.F., 8 6-pdr., and 12 3-pr. do., 7 M., 2 l.	7 f. tu. (2 sub.)	18.51 by log.	1240	5180
b. 1st cl.	Collingwood 2 s. (steel)	9500	9570	325 0	68 0	26 10	Pembroke	Humphrys	1886	x 520,000	y 104,000	18 comp.	16 comp.	12 to 14 comp.	17 to 10 2½"	4 45-ton, 6 6-in., 12 6-pdr. Q.F., 11 3-pr. do., 6 M., 2 l.	4 l. car.	16·50	1200	8500
t. 2nd c.	Colossus (steel) 2 s.	9420	7500	325 0	68 0	26 3	Portsm'th	Maudslay	1886	533,000	113,786	18 & 14 comp.	16 & 13 comp.	16 & 14 comp.	22 to 10 3"–2½"	4 45-ton, 5 6-in., 4 6-pdr. Q.F., 10 3-pdr. do., 6 M., 4 l.	2 l. car.	14·2	970	6200

x Includes Hydraulic Machinery, Gun Mountings, &c.

y Propelling Machinery.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Indicated Horse-Power.	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Completion.	Cost. Hull.	Cost. Machinery.	Armour. Side.	Armour. Bulk-head.	Armour. Turret or Barbette	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
t. 3rd c.	Conqueror. 2 s. (steel)	6200	6000	270 0	58 0	24 0	Chatham	Humphrys	1882	325,000	93,433	12to8½	11½ to 10½	12 turret & C.-T.	13½ to 9 2½–1¾"	2 45-ton, 4 6-in., 6 6-pdr. Q.F., 12 M., 2 l.	6 l. car.	15·3	650	5200
c.d.s. *t.*	Cyclops (iron) 2 s.	3560	1200	225 0	45 0	16 4	Blackwall	Elder	1871	136,426	17,600	8 & 6	9 & 8 on breastwork.	9 & 10	9 & 11 1½"	4 18-ton M.L.R., 4 3-pdr. Q.F., 5 M., 1 l.	..	9.9	250	1920
t. 2nd c.	Devastation 2 s. (iron)	9330	7000	285 0	62 3	27 6	Portsm'th	Maudslay New Machinery	1873	290,660	63,188	12 &10	12 &10 breastwork.	14 & 12	18 to16 3"–2"	4 29-ton, 6 6-pr. Q.F., 8 3-pr. do., 5 M., 2 l.	2 f. tu. (sub.)	14·0	1800	5980
t. 2nd c.	Dreadnought 2 s. (iron)	10,820	6500	320 0	63 10	26 9	Pembroke	Humphrys	1875	485,573	107,000	14,12, 11	13	14	18to15 3"–2"	4 38-ton M.L.R., 6 6-pdr. Q.F., 12 3-pr. do., 7 M., 2 l.	2 l. car.	13·7	1330	5720
t. 2nd c.	Edinburgh . 2 s. (steel)	9420	5500	325 0	68 0	26 3	Pembroke	Humphrys	1886	*x* 555,333	*y* 87,000	18 & 14 *comp.*	16 & 13 *comp.*	16 & 14 *comp.*	22to10 3"–2½"	4 45-ton, 5 6-in., 4 6-pdr. Q.F., 10 3-pr. do., 6 M., 2 l.	2 l. car.	14·2	970	6200
b. 1st cl.	Empress of India (steel) 2 s.	14,150	13,000 (*a*) 11,625	380 0	75 0	27 6 25 6	Pembroke	Humphrys	1893	Total. 838,087		18 *comp.* 4 above belt.	16 *comp.*	17 *comp*	.. 3"	4 67-ton, 10 6-in. Q.F., 16 6-pdr. do., 12 3-pdr. do., 8 M., 2 l.	7 f. tu. or l. car. (2 sub.)	17·5 18·0 by log.	900	5000
a.c. 1st cl	Galatea (steel) 2 s.	5600	8500	300 0	56 0	22 6	Glasgow .	Napier	1889	*x* 195,390	*y* 63,000	10 *comp.*	16 *comp.*	12 *comp.* C. T.	6 3"–2"	2 22-ton, 10 6-in., 6 6-pdr. Q.F., 10 3-pr. do., 6 M., 3 l.	4 l. car.	18·1	900	8000
c.d.s. *t.*	Glatton (iron) 2 s.	4910	2000	245 0	54 0	19 5	Chatham	Laird	1872	189,133	30,396	12to10	12 breast-work.	14 & 12	20 to15 3"–1½"	2 25-ton M.L.R., 3 6-pdr. Q.F., 4 M., 1 l.	2 sub. f. tu.	11·0	540	2000
c.d.s. *t.*	Gorgon (iron) 2 s.	3560	1200	225 0	45 0	16 4	Jarrow	Ravenhill	1872	122,904	15,663	8 & 6	9 & 8 breast-work.	9 & 10	11 to 9 1½"	4 18-ton M.L.R., 4 3-pdr. Q.F., 5 M., 2 l.	..	9·9	270	1230
c.d.s. *t.*	Hecate (iron) 2 s.	3560	1200	225 0	45 0	16 4	Poplar	Ravenhill	1872	124,906	15,687	8 & 6	9 & 8 breast-work.	9 & 10	11 to 9 1½"	4 18-ton M.L.R., 4 3-pdr. Q.F., 4 M., 1 l.	..	9·9	270	1230
c.b. 2nd c.	Hercules (iron)	8680	8500	325 0	59 0½	26 6	Chatham	Penn	1868	278,320	82,814	9 to 6	6 & 5	..	12 & 10	8 18-ton M.L.R., 2 12½-ton do., 4 6½-ton do., 6 4·7-in. Q.F., 9 6-pdr. do., 13 3-pr. do., 7 M., 3 l.	4 f. tu.	14·6	610	1760
t. 3rd c.	Hero (steel) 2 s.	6200	6000	270 0	58 0	24 0	Chatham	Rennie	1888	*x* 338,971	*y* 58,300	12 *comp.*	11½ *comp.*	12 *comp.*	13½ 2½–1¾"	2 45-ton, 4 6-in., 7 6-pdr. Q.F., 5 3-pr. do., 6 M., 2 l.	6 l. car.	15·2	620	5200
t. 1st cl	Hood (steel) 2 s.	14,150	13,000 (*a*) 11,446	380 0	75 0	27 6	Chatham	Humphrys	1893	Total. 830,536		18 *comp.* 4 above the belt.	17 Re-doubts *comp.*	18 *comp.*	.. 3"	4 67-ton, 10 6-in. Q.F., 10 6-pdr. do., 12 3-pdr. do., 8 M., 2 l.	7 f. tu. or l. car. (2 sub.)	17.5 17 by log	900	5000
c.d.s. *t.*	Hotspur (iron) 2 s.	4010	2500	235 0	50 0	21 10	Glasgow .	Napier	1871	135,067	36,461	11 & 8	8 breast-work.	10 & 8½	15to10 2"–1"	2 25-ton M.L.R., 2 6-in. 5-ton, 4 6-pr. Q.F., 10 M., 2 l.	2 l. car.	11·25	300	920
b. 1st cl.	Howe (steel) 2 s.	10,300	11,500	325 0	68 0	27 3	Pembroke	Humphrys	1889	*x* 560,469	*y* 106,553	18 *comp.*	16 *comp.*	11½ to 10 *comp.*	15to12 3"–2½"	4 67-ton, 6 6-in. 5-ton, 12 6-pdr. Q.F., 10 3-pr. do., 7 M., 2 l.	1 f. tu. 4 l. car.	16·8	1200	7200
c.d.s. *t.*	Hydra (iron) 2 s.	3560	1200	225 0	45 0	16 4	Glasgow	Elder	1872	124,454	16,918	8 & 6	9 & 8 on breastwork.	9 & 10	11 to 9 1½"	4 18-ton M.L.R., 4 3-pdr. Q.F., 5 M., 2 l.	..	9·9	250	1920
a.c. 1st cl.	Immortalité. 2 s. (steel)	5600	8500	300 0	56 0	22 6	Chatham	Earle	1889	*x* 221,500	*y* 57,000	10 *comp.*	16 *comp.*	12 C. T. *comp.*	6 3"–2"	2 22-ton, 10 6-in., 6 6-pdr. Q.F., 10 3-pr. do., 6 M., 3 l.	2 l. car.	18·1	900	8000
a.c. 1st cl.	Impérieuse . 2 s. (steel) (Copper sheathed.)	8400	10,000	315 0	62 0	27 4	Portsm'th	Maudslay	1886	*x* 417,437	*y* 113,377	10 *comp.*	9 *comp.*	8 *comp.*	10 4"–2"	4 24-ton, 10 6-in., 4 6-pdr. Q.F., 4 3-pr. do., 10 M., 2 l.	2 f. tu. 4 l. car.	16·7	1130	7000
t. 2nd c.	Inflexible (iron) 2 s.	11,880	6500	320 0	75 0	26 4	Portsm'th	Elder	1881	648,811	146,457	24, 20, 16	22,18, 14	17 & 16 *comp.*	17to25 3"	4 80-ton M.L.R., 8 4-in., 4 6-pr. Q.F., 2 3-pr. do., 16 M., 2 l.	2 f. tu. sub. 2 l. car.	12·8	1300	5200
c.b. 3rd c.	Invincible . 2 s. (iron)	6010	3500	280 0	54 0	23 2	Glasgow	Napier	1870	187,055	52,386	8 to 6	5	..	10	10 12-ton M.L.R., 6 4-in., 4 6-pdr. Q.F., 15 M., 4 l.	4 l. car.	12·5	500	1580

(*a*) Trials. *x* Includes Hydraulic Machinery, Gun Mountings, &c. *y* Propelling Machinery.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Indicated Horse-Power.	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Completion.	Cost. Hull.	Cost. Machinery.	Armour. Side.	Armour. Bulk-head.	Armour. Turret or Barbette	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
c.b. 3rd c.	**Iron Duke** . 2 *s.* (iron)	6010	3500	280 0	54 0	23 3	Pembroke	Ravenhill	1871	146,314	50,165	8 to 6	5	..	10	10 12-ton M.L.R., 4 5-in., 4 20-pdr., 4 6-pr. Q.F., 14 M., 4 l.	4 l. car	12·4	700	3900
b. 1st cl.	**Magnificent** . 2 *s.*	14,900	12,000	390 0	75 0	27 6	Chatham	Penn	Bldg.	..	..	..	..	..	..	4 12-in., 12 6-in. Q.F., 28 smaller do., 8 M.	..	17·5	..	..
b. 1st cl.	**Majestic** . 2 *s.*	14,900	12,000	390 0	75 0	27 6	Portsm'th	Barrow	Bldg.	..	..	..	..	..	..	4 12-in., 12 6-in. Q.F., 28 smaller do., 8 M.	..	17·5	..	..
a.c. 1st cl.	**Minotaur** (iron)	10,690	4000	400 0	59 4¾	27 3	Blackwall	Penn	1867	377,325	79,505	5½	4½	..	10	17 12-ton M.L.R., 4 4·7-in. Q.F., 8 3-pr. do., 8 M., 4 l.	2 l. car.	12·0	750	1200
t. 3rd c.	**Monarch** (iron) (Under repair.)	8320	8000	330 0	57 6	26 7	Chatham	Maudslay New Machinery	1869	279,903	74,672	7 to 6	5 & 4½	10 & 8	12	4 25-ton M.L.R., 2 12-ton do., 1 6½-ton do., 4 12-pr. Q.F., 10 3-pr. do., 6 M., 2 l.	2 f. tu.	14·5	630	1500
a.c. 1st cl.	**Narcissus** . 2 *s.* (steel)	5600	8500	300 0	56 0	22 6	Hull	Earle	1889	*x* 195,890	*y* 61,500	10 *comp.*	16 *comp.*	12 conning tower. *comp.*	6 3"–2"	2 22-ton, 10 6-in. 6 6-pdr. Q.F., 10 3-pr. do., 6 M., 3 l.	4 l. car.	18·1	900	8000
a.c. 1st cl.	**Nelson** (iron) 2 *s.* (Zinc sheathed.)	7630	5500	280 0	60 0	26 6	Glasgow	Elder	1880	303,310	87,545	9 & 6	9,8,6	9 conning tower.	13 to 10 3"–2"	4 18-ton M.L.R., 8 12-ton do., 4 4·7-in. Q.F., 6 6-pdr. do., 14 3-pr. do., 7 M., 3 l.	2 l. car.	13·6	1150	5200
t. 2nd c.	**Neptune** (iron) (Copper sheathed.)	9310	6000	300 0	63 0	26 1	Poplar	Penn	1878	600,000 (purchased).		12 to 9	8 & 6	11 & 13	11 to 13 3"–2"	4 38-ton M.L.R., 2 12-ton do., 8 3-pr. Q.F., 11 M., 2 l.	2 l. car.	13·4	670	1480
b	New Battleship No. 1	14,900	12,000	390 0	75 0	27 6	Portsm'th	..	Bldg.	..	..	..	..	..	..	4 12-in., 12 6-in. Q.F., 28 small do.	..	17·5	900	..
b	New Battleship No. 2	14,900	12,000	390 0	75 0	27 6	Chatham	..	Bldg.	..	..	..	..	..	..	4 12-in., 12 6-in. Q.F., 28 small do.	..	17·5	900	..
b	New Battleship No. 3	14,900	12,000	390 0	75 0	27 6	Pembroke	..	Pro.	..	..	..	..	..	..	4 12-in., 12 6-in. Q.F., 28 small do.	..	17·5	900	..
	New Battleship No. 4	Design not settled			..	..	Chatham	..	Pro.	..		..	..	..	..	..	..	..	..	..
	New Battleship No. 5	Design not settled			..	..	Portsm'th	..	Pro.	..		..	..	..	..	..	..	..	..	..
b.	New Battleship No. 6	14,900	12,000	390 0	75 0	27 6	..	..	Pro.	..		..	..	..	..	4 12-in., 12 6-in. Q.F., 28 small do.	..	17·5	900	..
b.	New Battleship No. 7	14,900	12,000	390 0	75 0	27 6	Contract	..	Pro.	..		..	..	..	..	4 12-in., 12 6-in. Q.F., 28 small do.	..	17·5	900	..
t. 1st cl.	**Nile** (steel) 2 *s.*	11,940	12,000	345 0	73 0	27 6	Pembroke	Maudslay	1890	Total. 819,717		20 to 16 *comp.*	18 to 14 *comp.*	18 *comp.*	6 3"	4 67-ton, 6 4·7-in. Q.F., 8 6-pr. do., 12 3-pr. do., 7 M., 3 l.	4 f. tu. 2 l. car. (2 sub.)	16·7	1200	6500
a.c. 1st cl.	**Northampton** 2 *s.* (iron) (Zinc sheathed.)	7630	4500	280 0	60 0	25 9	Glasgow	Penn	1878	296,836	98,968	9 & 6	9,8,6	9 conning tower.	13,10 3"–2"	4 18-ton M.L.R., 8 12-ton do., 6 6-pdr. Q.F., 8 3-pr. do., 10 M., 3 l.	2 l. car.	12·6	1150	3850
a.c. 1st cl.	**Northumberland** (iron) (under repair.)	10,780	4000	400 4	59 5	27 1	Millwall	Penn	1868	391,481	79,871	5½	4½	5½ conning tower.	10	7 12-ton M.L.R., 20 9-ton do., 1 6-in. 1 5-in., 6 4·7-in. Q.F., 10 3-pdr. do., 6 M., 5 l.	4 l. car.	12·0	756	1270
c.d.s. 2nd c. *c.b.*	**Orion** (iron) 2 *s.*	4870	2600	245 0	52 0	21 4	Poplar	Maudslay	1882	239,270	52,959	12, 10, 8, 7	9, 6, 5	9 conning tower.	16 & 9 3"–1"	4 25-ton M.L.R., 6 6-pdr. Q.F., 8 M., 2 l.	4 l. car.	11·9	520	1830
a.c. 1st cl.	**Orlando** (steel) 2 *s.*	5600	8500	300 0	56 0	22 6	Jarrow	Palmer	1888	*x* 206,647	*y* 60,165	10 *comp.*	16 *comp.*	12 C. T. *comp.*	6 3"–2"	2 22-ton, 10 6-in. 6 6-pdr. Q.F., 10 3-pr. do., 7 M., 3 l.	2 l. car.	18·1	900	8000
c.d.s. *c.b.*	**Penelope** (iron) 2 *s.*	4470	2700	260 0	50 0	17 6	Pembroke	Maudslay	1868	145,993	40,855	6 & 5	4½	..	10 & 11	8 9-ton M.L.R., 4 3-pdr. Q.F., 11 M., 4 l.	..	11·0	470	1360
c.d.s. *t.*	**Prince Albert** . (iron)	3880	1300	240 0	48 1	20 4	Poplar	Humphrys	1866	178,537	24,129	4½	..	10 & 5½	18 ¾"	4 12-ton M.L.R., 6 M., 2 l.	..	9·7	230	930
b. 1st cl.	**Ramillies** . 2 *s.* (steel)	14,150	13,000	380 0	75 0	27 6	Glasgow	Thomson	1893	Total. 874,255		18 *comp.* 4 above the belt.	16 *comp.*	17 *comp.*	.. 3"	4 67-ton, 10 6-in. Q.F., 16 6-pr. do., 12 3-pr. do., 8 M., 2 l.	7 f. tu. or 1. car (3 sub.)	17·5	900	5000
b. 1st cl.	**Renown** . . 2 *s.* (steel and copper sheathed)	12,350	12,000	380 0	72 0	26 9	Pembroke	Maudslay	Bldg.	Total 679,136		..	..	..	..	4 10-in. 29-ton, 10 6-in. Q.F., 8 12-pr. do., 12 3-pr. do., 8 M., 2 l.	7 f. tu. or 1. car. (2 sub.)	18·0	800	..

x Includes Hydraulic Machinery, Gun Mountings, &c. *y* Propelling Machinery.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Indicated Horse-Power.	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Completion.	Cost. Hull.	Cost. Machinery.	Armour. Side.	Armour. Bulk-head.	Armour. Turret or Barbette	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
b. 1st cl.	**Repulse** (steel) 2 *s.*	14,150	13,000 (*a*) 11,315	380 0	75 0	27 6	Pembroke	Humphrys	1894	Total. 841,274		18 *comp.* 4 above the belt.	16 *comp.*	17 *comp.*	.. 3″	4 67-ton, 10 6-in. Q.F., 16 6-pr. do., 12 3-pr. do., 8 M., 2 l.	7 f. tu. or l. car. (2 sub.)	17·5 17·5 by log	900	5000
b. 1st cl.	**Resolution** . 2 *s.* (steel)	14,150	13,000 (*a*) 11,402	380 0	75 0	27 6 24 8	Jarrow	Palmer	1893	Total. 852,755		18 *comp.* 4 above the belt.	16 *comp.*	17 *comp.*	.. 3″	4 67-ton, 10 6-in. Q.F., 16 6-pr. do., 12 3-pr. do., 8 M., 2 l.	7 f. tu. or l. car. (2 sub.)	17·5 17·9 by log	900	5000
b. 1st cl.	**Revenge** . 2 *s.* (steel)	14,150	13,000 (*a*) 11,536	380 0	75 0	27 6 25 6	Jarrow	Palmer	Bldg. Ld. 1892	Total. 852,755		18 *comp.* 4 above the belt.	16 *comp.*	17 *comp.*	.. 3″	4 67-ton, 10 6-in. Q.F., 16 6-pr. do., 12 3-pr. do., 8 M., 2 l.	7 f. tu. or l. car. (2 sub.)	17·5 17·5 by log	900	5000
b. 1st cl.	**Rodney** (steel) 2 *s.*	10,300	11,500	325 0	68 0	27 3	Chatham	Humphrys	1888	*x* 563,878	*y* 105,400	18 *comp.*	16 *comp.*	11½ to 10 *comp.*	15 to 12 3″–2½″	1 69-ton, 3 67-ton, 6 6-in. 5-ton, 12 6-pr. Q.F., 2 3-pr. do., 10 M., 2 l.	4 l. car.	16·75	1200	8500
b. 1st cl.	**Royal Oak** . 2 *s.* (steel)	14,150	13,000 (*a*) 11,571	380 0	75 0	27 6 25 0	Birkenh'd	Laird	1894	Total. 877,378		18 *comp.* 4 above the belt.	16 *comp.*	17 *comp.*	.. 3″	4 67-ton, 10 6-in. Q.F., 16 6-pr. do., 12 3-pr. do., 8 M., 2 l.	7 f. tu. or l. car. (2 sub.)	17·5 18¼ by log	900	5000
b. 1st cl.	**Royal Sovereign** (steel) 2 *s.*	14,260	13,312	380 0	75 0	27 6	Portsm'th	Humphrys	1892	Total. 824,583		18 *comp.* 4 above the belt	16 *comp.*	17 *comp.*	.. 3″	4 67-ton, 10 6-in. Q.F., 16 6-pr. do., 12 3-pr. do., 8 M., 2 l.	7 f. tu. or l. car. (2 sub.)	(*b*) 18·0	900	5000
c.d.s. *t.*	**Rupert** (iron) 2 *s.*	5440	6000	250 0	53 0	23 7	Chatham	Portsm'th	1874	193,171	39,506	11 & 9	12 breast-work.	14 & 12	14 & 10 3″–2″	2 22-ton, 2 6-in., 6-pr. Q.F., 6 3-pr. do., 2 M., 2 l.	4 l. car.	14·0	480	1340
t. 1st cl.	**Sans Pareil** . 2 *s.* (steel)	10,470	14,000	340 0	70 0	27 3	Blackwall	Humphrys	1889	*x* 609,109	*y* 110,333	16 to 18 *comp.*	16 *comp.*	18 *comp.*	6 3″	2 111-ton, 1 29-ton, 12 6-in. 5-ton, 12 6-pr. Q.F., 12 3-pr. do., 8 M., 2 l.	6 f. tu. 2 l. car. (2 sub.)	17·2	1200	7000
c.d.s. *t.*	**Scorpion** (iron)	2750	1000	224 6	42 4½	16 11	Birkenh'd	Laird	1865	92,033	18,540	4½	..	5	10 to 8	4 12-ton. M.L.R., 6 M., 1 l.	..	8·5	320	1210
a.c. 1st cl.	**Shannon** (iron) (Zinc sheathed.)	5390	2500	260 0	54 0	23 4	Pembroke	Laird	1877	233,902	53,367	9, 8, 6	9 & 8	9 C. T.	10 & 12 3″–1″	2 18-ton M.L.R., 7 12-ton do., 11 M., 8 l.	2 l. car.	11·2	580	2260
c.b. 2nd c.	**Sultan** . (iron) (under repair.)	9290	8000	325 0	59 0½	27 6	Chatham	Thomson New Machinery.	1871	281,373	76,042	9, 8, 6	6 to 4½	..	12 & 10	8 18-ton M.L.R., 4 12½-ton do., 4 4·7-in. Q.F., 9 6-pdr. do., 13 3-in. do., 7 M., 2 l.	4 f. tu.	14·0	810	2140
c.b. 2nd c.	**Superb** . (iron)	9170	8500 (?)	332 3	59 0	26 5	Blackwall	Maudslay	1880	443,000 (purchased)		12, 10,	7 10, 7, 5	6 8 C. T.	7 to 12 1½″	16 18-ton M.L.R., 6 4-in., 6 6-pdr. Q.F., 10 3-pdr. do., 6 M., 3 l.	4 l. car.	15·0	970	1810
c.b. 3rd c.	**Swiftsure** (iron) (Copper sheathed.)	6910	3500	280 0	55 0	26 0	Jarrow	Maudslay	1872	207,940	49,141	8 to 6	6, 5, 4	..	10	10 12-ton M.L.R., 8 4-in., 4 6-pr. Q.F., 4 3-pr. do., 12 M., 3 l.	4 l. car.	12.6	540	1630
c.b. & *b.* 2nd c.	**Temeraire** . 2 *s.* (iron) (Zinc sheathed.)	8540	6500	285 0	62 0	27 2	Chatham	Humphrys	1877	352,015	102,954	11, 10, 9, 8	8—5	10 fore 8 after barbette	12 & 10 1½″–1″	4 25-ton M.L.R., 4 18-ton do., 6 4-in., 4 6-pdr. Q.F., 10 3-pr. do., 8 M., 4 l.	2 l. car.	13·8	620	2680
t. 2nd c.	**Thunderer** . 2 *s.* (iron)	9330	7000	285 0	62 3	27 0	Pembroke	Maudslay	1877	306,084	52,458	12 & 10	12 & 10 breast-work.	14 & 12	18 to 16 3″–2″	4 10-in. 29-ton, 6 6-pdr. Q.F., 8 3-pr. do., 4 M., 2 l.	2 f. tu.	14·0	1600	3040
t. 1st cl.	**Trafalgar** . 2 *s.* (steel)	11,940	12,000	345 0	73 0	27 6	Portsm'th	Humphrys	1890	*x* 765,794	*y* 97,000	20 to 16 *comp.*	18 to 14 *comp.*	18 *comp.*	6 3″	4 67-ton, 6 4·7-in. Q.F., 8 6-pr. do., 12 3-pdr. do., 6 M., 3 l.	4 f. tu. (2 sub.) 2 l. car.	16·7	1200	6500
c.b. 3rd c.	**Triumph** . (iron) (Copper sheathed.)	6640	3500	280 0	55 0	26 2	Jarrow	Maudslay	1873	209,109	49,213	8 to 6	6, 5, 4	..	10	10 12-ton M.L.R., 4 5-in. 8 6-pr. Q.F., 8 3-pr. do., 5 M., 3 l.	4 l. car.	12·6	550	1680
a.c. 1st cl.	**Undaunted** 2 *s.* (steel)	5600	8500	300 0	56 0	22 6	Jarrow	Palmer Co.	1889	*x* 195,890	*y* 60,165	10 *comp.*	16 *comp.*	12 C. T. *comp.*	6 3″–2″	2 22-ton, 10 6-in. 6 6-pr. Q.F., 10 3-pdr. do., 6 M., 3 l.	4 l. car.	18·1	900	8000

(*a*) Trials. (*b*) Calculated from revolutions from data obtained on measured mile. *x* Includes Hydraulic Machinery, Gun Mountings, &c. *y* Propelling Machinery.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Indicated Horse-Power	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Completion.	Cost. Hull.	Cost. Machinery.	Armour. Side.	Armour. Bulk-head.	Armour. Turret, or Barbette	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
		tons.		ft. in.	ft. in.	ft. in.				£	£	in.	in.	in.	in.			knots.	tons.	knots.
a.c. 1st cl.	Warrior . (iron) (under repair.)	9210	4000	380 2	58 4	26 9	Blackwall	Penn	1861	282,284	74,409	4½	4½	..	18to10	4 9-ton, 28 6½-ton do., 8 M., 4 l.	..	12·7	790	1210
a.c. 1st cl.	Warspite . 2 s. (Copper sheathed.)	8400	F. D. 10,000	315 0	62 0	27 4	Chatham	Penn	1888	x 415,546	y 113,786	10 *comp.*	9 *comp.*	8 barbette.	10 4″–2″	4 22-ton, 10 6-in., 4 6-pdr. Q.F., 9 3-pdr. do., 6 M., 2 l.	2 f. tu. 4 l. car.	16·75	1130	7000
c.d.s. *t.*	Wivern . (iron)	2750	1000	224 6	42 4	17 0	Birkenh'd	Laird	1865	98,118	18,396	4½	..	5	8 to 10	4 12-ton M.L.R., 8 M., 1 l.	..	8·5	300	1150

The following, which appear in the Official Navy List, belong to India and Australia:—

Class.	NAME.	Displacement.	Indicated Horse-Power	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Completion.	Cost. Hull.	Cost. Machinery.	Armour. Side.	Armour. Bulk-head.	Armour. Turret, or Barbette	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dischargers.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
c.d.s *t.*	Abyssinia*(iron)2 s (*Indian Marine.*)	2900	950	225 0	42 0	14 6	Poplar	Dudgeon	1870	97,049	19,500	7 & 6	8 & 7 breast-work.	10 & 8	11 to 9 1½″–1″	4 8-in. 14-ton, 5 M., 2 l.	..	9·0	92	..
c.d.s. *t.*	Cerberus† (iron) 2 s. (*Colonial Marine.*)	3480	1660	225 0	45 0	15 3	Jarrow	Maudslay	1870	99,331	18,225	8 to 6	9 to 8 breast-work.	10 & 9	11 to 9 1½″–1″	4 10-in. 18-ton M.L.R., 4 M.	..	9·75	120	..
c.d.s. *t.*	Magdala * (iron) 2 s. (*Indian Marine.*)	3340	1440	225 0	45 0	15 3	Blackwall	Ravenhill	1870	115,400	17,000	8 to 6	9 to 8 breast-work.	10 & 9	11 to 9 1½″–1″	4 8-in. 14-ton, 5 M., 2 l.	..	10·0	120	..

* At Bombay. x Includes Hydraulic Machinery, Gun Mountings, &c. y Propelling Machinery. † At Melbourne.

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			Tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Sloop	Acorn	Comp.	970	1200	167 0	32 0	14 0	Milford Haven	Maudslay	1884	27,500	14,500	8 5-in. 38-cwt., 8 M., 1 l.	..	12·2	150	1900
Cruiser (2nd class)	Active	Iron wood and copper sheathed	3080	2100	270 0	42 0	21 4	Blackwall	Humphrys	1869	85,795	40,361	10 6-in., 2 64-pdrs. M.L.R., 9 M., 2 l.	2 l. car.	15·10	410	2000
" " P 2″–1″	Æolus 2 s.	Steel wood and copper sheathed.	3600	9000	300 0	43 0	17 6	Devonp'rt	Hawthorn	1892	Total. 208,450		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3 pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
Desp. Vessel	Alacrity 2 s.	Steel	1700	3000	250 0	32 6	14 0	Jarrow	Palmer	1885	x 48,289	y 29,680	10 6-pdr. Q.F., 2 M.	..	17·00	400	6150
1st Class Torpedo Gun Boat	Alarm 2 s.	Steel	810	3884	230 0	27 0	8 9	Sheerness	Penn	1892	Total. 59,346		2 4·7-in. Q.F., 4 3-pdr. do.	5 f. tu. or l. car	19·25 19·6 by log.	100	2500
Gun Boat (2nd class)	Albacore	Comp.	560	500	135 0	26 0	10 6	Birkenh'd	Laird	1883	18,000	10,556	2 5-in., 2 4-in., 2 M.	..	11·0	85	..
Sloop	Alert	Steel sheathed with Copper.	960	1400	180 0	32 6	11 6	Sheerness	Sheerness	Bldg.	Total. 59,566		6 4-in. 25-pdr. Q.F., 4 3-pdr. do., 2 M.		13·25	130	..
Cruiser (2nd class) pp. 1½″	Amphion 2 s.	Steel	4300	5000	300 0	46 0	20 6	Pembroke	Maudslay	1883	95,000	65,500	10 6-in. 5-ton, 4 3-pdr. Q.F., 13 M., 2 l.	4 l. car.	16·6	1000	11,000
" " P. 2″–1″	Andromache 2 s.	Steel	3400	9000	300 0	43 0	16 6	Chatham	Earle	1890	Total. 186,280		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000
1st class or Torpedo Gun Boat	Antelope 2 s.	Steel	810	3621	230 0	27 0	8 9	Devonp'rt	Yarrow	1893	Total. 61,397		2 4·7-in. Q.F., 4 3-pdr. do.	5 f. tu. or l. car	19·25	100	..
Cruiser (2nd class) P. 2″–1″	Apollo	Steel	3400	9000	300 0	43 0	16 6	Chatham	Earle	1891	Total. 186,361		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000
Cruiser (3rd class)	Archer 2 s.	Steel	1770	3500	225 0	36 0	14 6	Glasgow	Thomson	1885	x 55,916	y 31,667	6 6-in. 8 3-pr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	16·5	475	7000

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.

Class.		NAME.		Material of Hull.	Displacement.	Indicated Horse-Power.	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coal that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
					tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Cruiser (2nd class)	pp. 1½"	Arethusa	2 s.	Steel	4300	5000	300 0	46 0	20 6	Glasgow	Napier	1882	86,763	58,435	10 6-in. 4 3-pdr. Q.F., 10 M., 2 l.	4 l. car	16·6 17·00	1000	11,000
" "	P. 2"–1"	Astrea	2 s.	Steel copper sheathed	4360	9112	320 0	49 6	19 0	Devonp'rt	Devonport	1893	Total. 244,831		2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 tr. do.	19·75 by log.	400	..
Gun Boat (2nd class)		Banterer (d)		Comp.	465	360	125 0	23 6	10 0	Barrow	Barrow	1880	15,600	5,300	2 64-pdr. M.L.R., 2 20-pdr. 2 M.	..	9·8	40	..
Cruiser (3rd class)	P. 2"–1"	Barham	2 s.	Steel	1830	(a) 4538	280 0	35 0	13 3	Portsm'th	Hawthorn	1889	Total. 113,302		6 4·7-in. Q.F., 4 3-pdr. do., 2 M.	2 l. car.	(a) 18·6	140	2600
" "	P. 2"–1"	Barracouta	2 s.	Steel	1580	3000	220 0	35 0	14 0	Sheerness	Palmer	1889	Total. 96,615		6 4·7-in. Q.F., 4 3-pdr. do., 2 M.	2 l. car.	16·5	160	3400
" "	P. 2"–1"	Barrosa	2 s.	Steel	1580	3000	220 0	35 0	14 0	Portsm'th	Palmer	1889	Total. 79,238		6 4·7-in. Q.F., 4 3-pdr. do., 2 M.	2 l. car.	16·5	160	3100
Sloop		Basilisk	2 s.	Steel copper sheathed	1170	2000	195 0	28 0	12 6	Sheerness	Rennie	1889	Total. 58,013		8 5-in. 8 M.	..	14·7	160	3000
"		Beagle	2 s.	Steel copper sheathed	1170	2000	195 0	28 0	12 6	Portsm'th	Rennie	1889	Total. 56,474		8 5-in. 8 M.	..	14·5	160	3000
Cruiser (3rd class)	P. 2"–1"	Bellona	2 s.	Steel	1830	(b)	280 0	35 0	13 3	Newcastle	Hawthorn	1890	Total. 94,195		6 4·7-in. Q.F., 4 3-pdr. do., 2 M.	2 l. car.	17·8	140	2600
Cruiser (1st class)	P. 6"–3"	Blake	2 s.	Steel	9000	(c) 14,450	375 0	65 0	25 9	Chatham	Maudslay	1889	Total. 440,471		2 22-ton, 10 6-in. 16 3-pdr. Q.F., 7 M., 2 l.	2 f. tu. (sub.) 2 l. car.	(c) 19·12	1500	15,000
Cruiser (3rd class)	P. 2"–1"	Blanche	2 s.	Steel copper sheathed	1580	3000	220 0	35 0	14 0	Pembroke	Earle	1889	Total. 91,112		6 4·7-in. Q.F., 4 3-pdr. do., 2 M.	2 l. car.	16·5	160	3400
Cruiser (1st class)	P. 6"–3"	Blenheim	2 s.	Steel	9000	21,411	375 0	65 0	25 9	Thames Ironworks	Humphrys	1890	425,591		2 22-ton, 10 6-in. Q.F., 16 3-pdr. do., 7 M., 2 l.	2 f. tu. (sub.) 2 l. car.	21·6	1500	15,000
Cruiser (3rd class)	P. 2"–1"	Blonde	2 s.	Steel copper sheathed	1580	2800	220 0	35 0	14 0	Pembroke	Earle	1889	Total. 90,059		6 4·7-in. Q.F., 4 3-pdr. do., 2 M.	2 l. car.	16·7	160	3400
Cruiser (2nd class)		Boadicea		Iron copper sheathed	4140	4500	280 0	45 0	23 8	Portsm'th	Rennie	1875	153,167	70,409	2 6-in., 12 90-cwt. M.L.R., 4 6-pdr. Q.F., 2 3-pdr. do., 10 M., 2 l.	2 l. car.	14·7	570	3000
Cruiser (2nd class)	P. 2"–1"	Bonaventure	2 s.	Steel copper sheathed	4360	9365	320 0	49 6	19 0	Devonp'rt	Hawthorn	1892	Total. 247,128		2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr. do., 1 3-pr. do., 4 M., 1 l.	2 f. tu. 2 tr. do.	19·5	400	..
1st Class or Torpedo Gun Boat		Boomerang (Special for Australia)	2 s.	Steel	735	(e) 3500	230 0	27 0	8 3	Elswick	Bellis	1889	Total. 49,962		2 4·7-in. Q.F., 4 3-pdr. do., 1 M.	1 f. tu. 2 l. car.	20·0	100	2500
Gun Boat (1st class)		Bramble	2 s.	Comp.	715	1000	165 0	29 0	11 0	Belfast	Harland	1886	39,835	10,000	6 4-in. 25-cwt., 4 M.	..	13·0	105	2500
Cruiser (2nd class)	P. 2"–1"	Brilliant	2 s.	Steel copper sheathed.	3600	9164	300 0	43 8	17 6	Sheerness	Hawthorn	1891	Total. 204,228		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3-pr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·7	400	8000
Cruiser (3rd class)		Brisk	2 s.	Steel	1770	3500	225 0	36 0	14 3½	Glasgow	Thomson	1886	55,916	31,667	6 6-in., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	16·5	325	4850
Gun Boat (2nd class)		Bullfrog		Comp.	465	360	125 0	23 6	9 6	Pembroke	Maudslay	1881	16,300	6,050	2 64-pdr. M.L.R., 2 20-pdr., 2 M.	..	9·8	40	..
Sloop		Buzzard	2 s.	Comp.	1140	2000	195 0	28 0	11 6	Sheerness	Barrow	1887	42,500	16,200	8 5-in., 8 M.	..	14·50	160	3000
Cruiser (3rd class)	pp. 1½"	Calliope		Steel copper sheathed	2770	4020	235 0	44 6	19 11	Portsm'th	Rennie	1884	82,000	38,000	4 6-in., 12 5-in. 38-cwt., 10 M., 2 l.	2 l. car.	14·6	550	4000
" "	pp. 1½"	Calypso		Steel Do.	2770	3720	235 0	44 6	19 11	Chatham	Rennie	1883	82,000	37,500	4 6-in., 12 5-in. 38-cwt., 10 M., 2 l.	2 l. car.	14·6	550	4000
Cruiser (2nd class)	P. 2"–1"	Cambrian	2 s.	Steel Do.	4360	9259	320 0	49 6	19 0	Pembroke	Hawthorn	1893	Total. 236,919		2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr. do., 1 3-pr. do., 4 M., 1 l.	2 f. tu. 2 tr. do.	19·5	400	..
Cruiser (3rd class)	pp. 1½"	Canada		Steel Do.	2380	2430	225 0	44 6	19 1	Portsm'th	Rennie	1881	78,000	26,500	10 6-in. 5-ton, 8 M., 2 l.	2 l. car.	12·75	470	5400

x Includes Gun Mountings, &c. y Propelling Machinery. (a) Natural draught. The estimated horse-power with forced draught was 6000, and the speed 19·5 knots.
(b) Horse-power corresponding to speed given not ascertainable. (c) Natural draught. This trial was made in shallow water. The estimated horse-power with forced draught was 20,000, and the speed 22 knots.
(d) Ineffective. (e) The horse-power with forced draught was intended to be 4500, and the speed 21 knots.

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GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

Class.		NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
				tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Cruiser (3rd class)	pp. 1¼"	Caroline	*Comp.*	1420	1440	200 0	38 0	15 9	Sheerness	Maudslay	1882	56,000	15,000	14 5-in. 38-cwt., 8 M., 1 l.	..	12·6	400	6400
" "	pp. 1½"	Carysfort	Steel copper sheathed	2380	2400	225 0	44 6	19 3	Glasgow	Elder	1878	84,512	29,942	2 90-cwt. M.L.R., 12 64-pdr. do., 6 M., 2 l.	2 l. car.	12·75	470	3840
" "	pp. 1½"	Champion	Steel copper sheathed	2380	2340	225 0	44 6	19 3	Glasgow	Elder	1878	84,288	29,695	4 6-in., 8 5-in., 4 3-pdr. Q.F., 6 M., 2 l.	2 l. car.	12·75	470	3840
Cruiser (2nd class)	P. 2"–1"	Charybdis 2 s.	Steel copper sheathed	4360	9000	320 0	49 6	19 0	Sheerness	Earle	1893	Total. 237,344		2 6-in. Q.F., 8 4·7-in do., 8 6-pdr. do., 1 3-pr. do., 4 M., 1 l.	2 f. tu. 2 tr. do.	19·5	400	..
1st Class or Torpedo Gun Boat		Circe 2 s.	Steel	810	3500	230 0	27 0	8 9	Sheerness	Penn	1892	Total. 61,979		2 4·7-in. Q.F., 4 3-pdr. do.	5 f. tu., or 1. car.	19·25	100	2500
Cruiser (3rd class)	pp. 1½"	Cleopatra	Steel copper sheathed	2380	2000	225 0	44 6	19 3	Glasgow	Humphrys	1878	86,126	27,798	4 6-in., 8 5-in., 4 3-pdr. Q.F., 6 M., 2 l.	2 l. car.	13·0	470	3280
Gun Boat (2nd class)		Cockchafer	*Comp.*	465	360	125 0	23 6	9 6	Pembroke	Maudslay	1881	16,000	61,000	2 64-pdr. M.L.R., 2 20-pdr. 2 M.	..	9·8	40	..
Cruiser (3rd class)	pp. 1½"	Comus	Steel copper sheathed	2380	2000	225 0	44 6	19 3	Glasgow	Elder	1878	84,497	29,477	4 6-in. 8 64-pdr. M.L.R., 8 M., 2 l.	2 l. car.	12·75	470	3800
" "	pp. 1½"	Conquest	Steel copper sheathed	2380	2000	225 0	44 6	19 3	Glasgow	Humphrys	1878	83,707	27,205	2 90-cwt. M.L.R., 12 64-pdr. do., 6 M., 2 l.	2 l. car.	13·0	470	3280
" "	pp. 1½"	Constance	Steel Do.	2380	2000	225 0	44 6	19 3	Chatham	Penn	1880	78,000	32,000	2 90-cwt. M.L.R., 12 64-pdr. do., 6 M., 2 l.	2 l. car.	13·0	470	5000
" "	pp. 1½"	Cordelia	Steel Do.	2380	2000	225 0	44 6	19 3	Portsm'th	Rennie	1881	78,000	26,500	10 6-in. 5-ton, 10 M., 2 l.	2 l. car.	12·75	470	5400
Cruiser (3rd class)		Cossack 2 s.	Steel	1770	3500	225 0	36 0	14 3½	Glasgow	Thomson	1886	x 55,916	y 31,667	6 6-in., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	16·5	325	4850
Cruiser (1st class)	P. 5"–1"	Crescent 2 s.	Steel copper sheathed	7700	12,000 10,378 trial.	360 0	60 0	23 9	Portsm'th	Penn	1892	Total. 383,068		1 22-ton, 12 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do., 7 M., 2 l.	2 f. tu. (sub.) 2 tr. do.	19·7	850	10,000
Cruiser (3rd class)	pp. 1½"	Curaçoa	Steel copper sheathed	2380	2000	225 0	44 6	19 3	Glasgow	Humphrys	1878	85,833	27,098	4 6-in., 8 5-in., 1 3-pdr. Q.F., 9 M., 2 l.	2 l. car.	13·0	470	3280
Gun Vessel (1st class)		Curlew 2 s.	Steel	950	1200	195 0	28 0	10 6	Devonp'rt	Penn	1885	x 37,363	y 12,600	1 6-in., 3 5-in., 7 M.	1 b. tu. 2 l. car.	14·5	250	10,000
Sloop		Daphne 2 s.	*Comp.*	1140	2000	195 0	28 0	11 6	Sheerness	Greenock F'ndry Co.	1888	x 42,400	y 15,200	8 5-in., 8 M.	..	14·5	160	..
Sloop		Dolphin	*Comp.*	925	750	157 0	32 0	14 0	Middl'sbro	Hawthorn	1882	25,850	9,800	2 6-in., 2 5-in., 3 M., 1 l.	..	11·3	135	1700
1st Class or Torpedo Gun Boat		Dryad 2 s.	Steel	1070	3500	250 0	30 6	9 0	Chatham	Maudslay	1893	Total. 73,491		2 4·7-in. Q.F., 4 6-pdr. do.	3 f. tu. or l. car	19·0	100	2800
Cruiser (2nd class)	P.	Eclipse 2 s.	Steel copper sheathed	5600	9600	350 0	53 0	20 3	Portsm'th	Portsm'th	Bldg.	484,633		5 6-in. Q.F., 6 4·7-in. do., 8 12-pr. do., 1 3-pr. do., 4 M., 1 l.	5 f. tu. (2 sub.)	19·5	550	..
Cruiser (1st class)	P. 5"–1"	Edgar 2 s.	Steel	7350	(a) 13,250	360 0	60 0	23 9	Devonp'rt	Elder	1890	Total. 401,083		2 22-ton, 10 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do., 7 M., 2 l.	4 tu. (2 sub. 2 tr.)	(a) 20·5	850	10,000
Sloop		Egeria (Surveying Service)	*Comp.*	940	700	160 0	31 4	14 3	Pembroke	Humphrys	1873	32,468	10,414	4 20-pdr. 2 M., 1 l.	..	11·3	100	1000
Cruiser (3rd class)		Emerald	*Comp.*	2120	1800	220 0	40 0	19 0	Pembroke	Thomson	1876	72,312	26,130	4 6-in., 8 5-in. 7 M., 2 l.	..	12·2	250	2280

x Includes Gun Mountings, &c. y Propelling Machinery. (a) Between Plymouth and Falmouth 20·97 knots for 4 hours with 12,550 H.P.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Cruiser (1st Class) P. 5″–1″	Endymion 2 s.	Steel	7350	12,000 10,662 trial.	360 0	60 0	23 9	Hull	Earle	1891	Total. 350,459		2 22-ton, 10 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do., 7 M., 2 l.	4 tu. (2 sub. 2 tr.)	20·0	850	10,000
Sloop	Espiegle	*Comp.*	1130	800	170 0	36 0	16 3	Devonp'rt	Maudslay	1880	37,000	11,770	10 5-in., 8 M., 1 l.	..	11·5	150	1480
Cruiser (3rd class)	Fearless 2 s.	Steel	1580	3200	220 0	34 3	14 6	Barrow	Barrow	1886	x64,202	23,250	4 5-in., 8 3-pdr. Q.F., 2 M., 1 l.	3 f. tu. (1 sub) 4 l. car.	16·7	450	6900
Gun Boat (2nd class)	Firebrand	*Comp.*	455	360	125 0	23 6	10 0	Glasgow	Thomson	1877	16,500	6,300	2 5-in., 2 4-in., 2 M.	..	10·17	40	..
„ „	Firefly	*Comp.*	455	360	125 0	23 6	10 0	Glasgow	Thomson	1877	16,400	6,300	2 64-pdr. M.L.R., 2 20-pdr., 2 M.	..	9·99	40	..
„ „	Firm	*Comp.*	455	360	125 0	23 6	10 0	Hull	Earle	1877	16,550	6,080	2 64-pdr. M.L.R., 2 20-pdr., 2 M.	..	10·2	40	..
Cruiser (2nd class) P. 2″–1″	Flora 2 s.	Steel copper sheathed	4360	9000	320 0	49 6	19 0	Pembroke	Barrow	1893	Total. 231,410		2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 tr. do.	19·5	400	..
Cruiser (2nd class) P. 2″–1″	Forte 2 s.	Steel copper sheathed	4360	9000	320 0	49 6	19 0	Chatham	Chatham	1893	Total. 234,956		2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 tr. do.	19·5	400	..
Cruiser (2nd class) P. 3″–2″	Forth 2 s.	Steel	4050	5700	300 0	46 0	20 0	Pembroke	Hawthorn	1886	151,952	50,000	2 15-ton, 10 6-in., 3 6-pdr. Q.F., 8 3-pdr. do., 6 M., 2 l.	2 l. car.	16·8	900	8750
„ „ P. 2″–1″	Fox	Steel copper sheathed	4360	9000	320 0	49 6	19 0	Portsm'th	Portsm'th	1893	Total. 234,229		2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 tr. do.	19·5	400	..
Gun Boat (2nd class)	Foxhound	*Comp.*	455	360	125 0	23 6	10 0	Barrow	Hawthorn	1877	14,150	6,550	2 64-pdr. M.L.R., 2 20-pdr., 2 M.	..	9·6	40	..
Sloop	Gannet	*Comp.*	1130	800	170 0	36 0	15 9	Sheerness	Humphrys	1878	39,581	12,889	2 90-cwt. M.L.R., 3 64-pdr. do., 2 5-in. 38-cwt., 6 M., 1 l.	..	11·53	150	1480
Cruiser (3rd class)	Garnet	*Comp.*	2120	1800	220 0	40 0	19 7	Chatham	Hawthorn	1877	64,689	27,779	14 5-in. 40-cwt., 7 M., 2 l.	..	12·2	260	2000
Cruiser (1st class) P. 5″–1″	Gibraltar 2 s.	Steel copper sheathed	7700	12,000 10,445 trial.	360 0	60 0	23 9	Glasgow	Napier	1892	Total. 347,634		2 22-ton, 10 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do., 7 M., 2 l.	4 tu. (2 sub. 2 tr.)	19·7	850	10,000
1st Class or Torpedo Gun Boat	Gleaner	Steel	735	(a) 3632	230 0	27 0	8 3	Sheerness	Sheerness	1890	Total. 63,798		2 4·7-in. Q.F., 4 3-pdr. do.	5 f. tu. or l. car	(a) 20·1	100	2500
Gun Boat (1st class)	Goldfinch	*Comp.*	805	1200	165 0	31 0	11 7½	Sheerness	Sheerness	1889	Total. 40,889		6 4-in., 2 3-pdr. Q.F., 2 M.	..	13·0	105	2500
1st Class or Torpedo Gun Boat	Gossamer	Steel	735	(a) 3600	230 0	27 0	8 3	Sheerness	Sheerness	1890	Total. 54,490		2 4·7-in. Q.F., 4 3-pdr. do.	5 f. tu. or l. car	(a) 19·8	100	2500
Cruiser (1st class) P. 5″–1″	Grafton 2 s.	Steel	7350	12,000 13,483 trial.	360 0	60 0	23 9	Blackwall	Humphrys	1892	Total. 351,851		2 22-ton, 10 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do., 7 M., 2 l.	4 tu. (2 sub. 2 tr.)	20·0	850	10,000
Gun Boat (2nd class)	Grappler	*Comp.*	465	360	125 0	23 6	10 0	Barrow	Barrow	1880	15,600	5,250	2 64-pdr. M.L.R., 2 20-pdr. 2 M.	..	9·8	..	..
1st Class or Torpedo Gun Boat	Grasshopper 2 s.	Steel	525	2700	200 0	23 0	8 9	Sheerness	Maudslay	1887	x20,897	y13,168	1 4-in., 6 3-pdr. Q.F.	2 f. tu. 2 l. car.	19·0	80	2400
„ „	Halcyon 2 s.	Steel	1070	3500	250 0	30 6	9 0	Devonp'rt	Hawthorn	Bldg.	Total. 75,726		2 4·7-in. Q.F., 4 6-pdr. do.	5 f. tu. or l. car	19·0	100	2500
„ „	Harrier 2 s.	Steel	1070	3500	250 0	30 6	9 0	Devonp'rt	Hawthorn	1894	Total. 75,533		2 4·7-in. Q.F., 4 6-pdr. do.	5 f. tu. or l. car	19·0	100	2500

x Includes Gun Mountings, &c.

y Propelling Machinery.

(a) The estimated horse-power with forced draught was 4500, and the estimated speed 21·0 knots.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Cruiser . P. (1st class) 5″-1″	Hawke . 2 s.	Steel	7350	12,000	360 0	60 0	23 9	Chatham.	Elder	1891	Total. 365,491		2 22-ton, 10 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do., 7 M., 2 l.	4 tu. (2 sub. 2 tr.)	20·0	850	10,000
1st Class or Torpedo Gun Boat	Hazard . 2 s.	Steel	1070	3500	250 0	30 6	9 0	Pembroke	Elder	1894	Total. 74,076		2 4·7-in. Q.F., 4 6-pdr. do.	5 f. tu. or l. car	19·00	100	2500
" "	Hebe . 2 s.	Steel	810	3566	230 0	27 0	8 9	Sheerness	Sheerness	1892	Total. 73,433		2 4·7-in. Q.F., 4 3-pdr. do.	5 f. tu. or l. car	19·25	100	2500
Torpedo Depôt Ship.	Hecla .	Iron	6400	2400	391 7	38 9	24 3	(Purchased) Built and Engined by Harland & Wolff.		1878	Total. 126,190		4 64-pdr. M.L.R., 1 5-in. 1 40-pdr., 14 M.	3 f. tu. 2 l. car.	13·0	2,200	26,400
Cruiser . P. (2nd class) 2″-1″	Hermione 2 s.	Steel copper sheathed	4360	9000	320 0	49 6	19 0	Devonp'rt	Thomson	1893	Total. 232,377		2 6-in. Q.F., 8 4·7-in. do., 8 6-pdr., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 tr. do.	19·5	400	..
Cruiser . pp. (3rd class) 1¼″	Heroine .	*Comp.*	1420	950	200 0	38 0	15 9	Devonp'rt	Humphrys.	1881	52,500	14,500	8 6-in., 4 M., 1 l.	..	11·4	400	6000
1st Class or Torpedo Gun Boat	Hussar . 2 s.	Steel	1070	3500	250 0	30 6	9 0	Devonp'rt	Hawthorn.	Bldg.	Total. 75,608		2 4·7-in. Q.F., 4 6-pdr. do.	5 f. tu. or l. car	19·0	100	..
Cruiser . pp. (3rd class) 1¼″	Hyacinth .	*Comp.*	1420	950	200 0	38 0	15 9	Devonp'rt	Humphrys.	1881	52,500	14,500	8 6-in., 4 M., 1 l.	..	11·4	400	6000
Sloop .	Icarus .	*Comp.*	970	1230	167 0	32 0	13 6	Devonp'rt	Barrow	1885	x39,369	y12,735	8 5-in., 4 3-pdr. Q.F., 4 M., 1 l.	..	12·2	150	2300
Cruiser . (2nd class)	Inconstant .	Iron copper sheathed	5780	4200	337 4	50 3	25 6	Pembroke	Penn	1868	138,585	74,739	10 12-ton M.L.R., 6 6½-ton do., 2 3-pdr. Q.F., 11 M., 8 l.	2 l. car.	16·20	750	2780
" " P. 2″-1″	Indefatigable 2 s.	Steel copper sheathed	3600	9000	300 0	43 8	17 6	Glasgow .	London and Glasgow	1891	Total. 181,024		2 6-in., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
" " P. 2″-1″	Intrepid . 2 s.	Steel copper sheathed	3600	9471	300 0	43 8	17 6	Glasgow .	London and Glasgow	1891	Total. 181,157		2 6-in., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·7	400	8000
" " P. 2″-1″	Iphigenia 2 s.	Steel copper sheathed	3600	9000	300 0	43 8	17 6	Glasgow .	London and Glasgow	1891	Total. 181,879		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
" "	Iris . 2 s.	Steel	3730	6000	300 0	46 0	22 0	Pembroke	Maudslay .	1877	110,868	102,318	13 5-in., 4 3-pdr. Q.F., 8 M., 1 l.	4 l. car	18·0	780	4400
1st Class or Torpedo Gun Boat	Jaseur . 2 s.	Steel	810	3711	230 0	27 0	8 9	Barrow .	Barrow	1892	Total. 48,238		2 4·7-in. Q.F., 4 3-pdr. do.	5 f. tu. or l. car	19·25	100	2500
" "	Jason . 2 s.	Steel	810	3540	230 0	27 0	8 9	Barrow .	Barrow	1892	Total. 49,253		2 4·7-in. Q.F., 4 3-pdr. do.	5 f. tu. or l. car	19·25 by log.	100	2500
" "	Karrakatta 2 s. (Special for Australia)	Steel	735	(b) 3500	230 0	27 0	8 3	Elswick .	Bellis	1890	x 26,456	y 21,193	2 4·7-in. Q.F., 4 3-pdr. do.	3 f. tu. or l. car	20·0	100	2500
Cruiser . P. (3rd class) 2″-1″	Katoomba . (Special for Australia)	Steel	2575	7500	265 0	41 0	15 6	Elswick .	Hawthorn.	1889	Total. 116,719		8 4·7-in. Q.F., 8 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Gun Vessel . (1st class)	Landrail . 2 s.	Steel	950	1200	195 0	28 0	10 6	Devonp'rt	Penn	1886	37,363	12,600	1 6-in., 3 5-in., 4 3-pdr. Q.F., 3M.	1 b. tu. 2 l. car.	14·5	250	10,000
Gun Boat . (1st class)	Lapwing .	*Comp.*	805	1200	165 0	31 0	11 7½	Devonp'rt	Devonport	1889	Total. 39,952		6 4-in. 25-cwt., 2 3-pdr. Q.F., 2 M.	..	13·0	105	2500
Cruiser . P. (2nd class) 2″-1″	Latona . 2 s.	Steel	3400	9600	300 0	43 0	16 6	Barrow .	Barrow	1890	Total. 171,068		2 6-in. Q.F., 6 4·7 in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car	20·0	400	8000
" " pp. 1½″	Leander . 2 s.	Steel	4300	5000	300 0	46 0	20 6	Glasgow .	Napier	1882	87,843	60,610	10 6-in. 5-ton, 4 3-pdr. Q.F., 14 M., 2 l.	4 l. car.	16·6	1000	11,000
1st Class or Torpedo Gun Boat	Leda . 2 s.	Steel	810	3597	230 0	27 0	8 9	Sheerness	Penn	1892	Total. 62,145		2 4·7-in. Q.F., 4 3-pdr. do.	5 f. tu. or l. car	19·25 18·3 by log.	100	..

x Includes Gun Mountings, &c. y Propelling Machinery. (b) The intended horse-power with forced draught was 4500, and the speed 21·0 knots.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Gun Vessel (2nd class)	Linnet . 2 s.	*Comp.*	756	870	165 0	29 0	10 11	Blackwall	Rennie	1880	25,281	10,382	2 90-cwt. M.L.R., 4 6-pdr. Q.F., 2 M.	..	11·80	180	2400
Gun Vessel (2nd class)	2 New Ships	..	1050	..	185 0	32 6	11 3	Devonp'rt	..	Pro.	..	..	6 4-in. Q.F., 4 3-pdr. do.	..		160	..
Gun Boat (1st class)	Lizard	*Comp.*	715	1000	165 0	29 0	11 10	Belfast	Harland	1886	42,770	10,000	6 4-in., 4 M.	..	13·00	105	2500
Cruiser (3rd class) P. 1½"	Magicienne 2 s.	Steel copper sheathed	2950	9000	265 0	42 0	17 6	Glasgow	Hawthorn	1888	Total. 136,000		6 6-in., 9 6-pdr. Q.F., 1 3-pdr. do., 3 M., 1 l.	2 f. tu. 2 l. car.	19·0	400	8000
Gun Boat (1st class)	Magpie	*Comp.*	805	1200	165 0	31 0	11 7½	Pembroke	Earle	1889	*x*29,400	*y* 9,300	6 4-in., 4 M.	..	13·0	105	2500
Cruiser (3rd class) P. 1½"	Marathon	Steel copper sheathed	2950	9000	265 0	42 0	17 6	Glasgow	Hawthorn	1888	Total. 136,000		6 6-in., 9 6-pdr. Q.F., 1 3-pdr. do., 3 M., 1 l.	2 f. tu. 2 l. car	19·0	400	8000
Sloop	Mariner	*Comp.*	970	850	167 0	32 0	14 0	Devonp'rt	Hawthorn.	1884	37,156	12,841	8 5-in. 38-cwt., 8 M., 1 l.	..	11·50	150	2300
Cruiser (3rd class) P. 1½"	Medea . 2 s.	Steel	2800	9000	265 0	41 0	16 6	Chatham	Humphrys	1888	*x*88,400	*y*53,300	6 6-in., 9 6-pdr. Q.F., 13-pdr. do., 3 M., 1 l.	2 f. tu. 2 l. car	19·0	400	8000
" " P. 1½"	Medusa . 2 s.	Steel	2800	9000	265 0	41 0	16 6	Chatham	Humphrys	1888	*x*88,400	*y*53,300	6 6-in., 9 6-pdr. Q.F., 13-pdr. do., 3 M., 1 l.	2 f. tu. 2 l. car	19·0	400	8000
Cruiser (2nd class) P. 2"–1"	Melampus 2 s.	Steel	3400	9000	300 0	43 0	16 6	Barrow	Barrow	1890	Total. 171,635		2 6-in., 6 4·7 in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000
Sloop	Melita	*Comp.*	970	1200	167 0	32 0	13 6	Malta	Malta Dock Yard	1888	Total. 60,179		8 5-in., 8 M., 1 l.	..	12·50	150	2100
Cruiser (3rd class) P. 1½"	Melpomene 2 s.	Steel copper sheathed	2950	9000	265 0	41 0	17 6	Portsm'th	Palmer Co.	1888	*x*92,000	*y*50,000	6 6-in., 9 6-pdr. Q.F., 1 3-pdr. do., 3 M., 1 l.	2 f. tu. 2 l. car	19·0	400	8000
Cruiser (2nd class)	Mercury . 2 s.	Steel	3730	6000	300 0	46 0	22 0	Pembroke	Maudslay	1878	119,452	93,800	13 5-in., 4 3-pdr. Q.F., 9 M., 1 l.	4 l. car.	16·8	780	4950
Cruiser (2nd class) P. 3"–2"	Mersey . 2 s.	Steel	4050	6000	300 0	46 0	19 6	Chatham.	Humphrys.	1885	100,000	54,000	2 15-ton, 10 6-in., 3 6-pr. Q.F., 2 3-pdr. do., 9 M., 2 l.	2 tu. sub 2 l. car.	17·3	900	8750
Cruiser (3rd class) P. 2"-1"	Mildura . 2 s. (Special for Australia)	Steel	2575	7500	265 0	41 0	15 6	Elswick	Hawthorn.	1889	Total. 116,062		8 4·7-in. Q.F., 8 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Cruiser (2nd class) P.	Minerva . 2 s.	Steel copper sheathed.	5600	9600	350 0	53 0	20 3	Chatham.	Chatham	Bldg.	..	..	5 6-in. Q.F., 6 4·7-in. do., 8 12-pr. do. 1 3-pr. do., 4 M., 1 l	3 f. tu. (2 sub.)	19·5	550	..
Gun Boat (2nd class)	Misletoe	*Comp.*	560	500	135 0	26 0	13 4	Birkenh'd	Laird	1883	18,000	8,500	2 5-in., 2 4-in., 2 M., 2 l.	..	10·7	95	..
Cruiser (3rd class)	Mohawk 2 s.	Steel	1770	3500	225 0	36 0	14 6	Glasgow	Thomson	1886	*x*55,916	*y*31,667	6 6-in., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	16·5	475	7000
Sloop	Mutine	*Comp.*	1130	800	170 0	36 0	15 9	Devonp'rt	Maudslay	1880	37,500	11,770	10 5-in., 8 M., 1 l.	..	12·10	150	1480
Cruiser (2nd class) P. 2"–1"	Naiad . 2 s.	Steel	3400	9000	300 0	43 0	16 6	Barrow	Barrow	1890	Total. 171,445		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000
1st Class or Torpedo Gun Boat	Niger . 2 s.	Steel	810	3784	230 0	27 0	8 9	Barrow	Barrow	1892	Total. 48,177		2 4·7-in. Q.F., 4 3-pdr. do.	5 f. tu. or l. car	19·3	100	2500
Sloop	Nymphe	*Comp.*	1140	2000	195 0	28 0	12 6	Portsm'th	Greenock F'ndry Co.	1888	*x*42,400	*y*15,200	8 5-in., 8 M.	..	14·50	160	3000
1st Class or Torpedo Gun Boat	Onyx . 2 s.	Steel	810	3548	230 0	27 0	8 9	Birkenh'd	Laird	1892	Total. 53,961		2 4·7-in. Q.F., 4 3-pdr. do.	5 f. tu. or l. car	19·25	100	2500
Cruiser (3rd class) P. 2"–1"	Pallas . 2 s.	Steel	2575	7610	265 0	41 0	15 6	Portsm'th	Hawthorn.	1890	Total. 148,828		8 4·7-in. Q.F., 8 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Gun Boat (1st class)	Partridge	*Comp.*	755	1200	165 0	30 0	11 4	Devonp'rt	Devonport	1888	27,800	10,000	6 4-in. 25-cwt., 4 M.	..	13·25	105	2500
" "	Peacock	*Comp.*	755	1200	165 0	30 0	11 4	Pembroke	Barrow Co.	1888	27,600	10,000	6 4-in. 25-cwt., 4 M.	..	13·25	105	2500
Cruiser (3rd class) P. 2"–1"	Pearl . 2s.	Steel	2575	7500	265 0	41 0	15 6	Pembroke	Earle	1890	Total. 151,693		8 4·7-in. Q.F., 8 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800

x Includes Gun Mountings, &c. *y* Propelling Machinery.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Sloop	Pelican	*Comp.*	1130	800	170 0	36 0	15 3	Devonp'rt	Humphrys	1877	41,282	14,939	2 6-in., 6 5-in., 4 M., 1 l.	..	12·00	150	1480
"	Penguin (Surveying service)	*Comp.*	1130	700	170 0	36 0	16 1	Glasgow	Hawthorn	1876	39,611	12,500	2 64-pdr. M.L.R., 2 M., 1 l.	..	11·00	150	1500
Cruiser (2nd class) pp. 1½"	Phaeton 2 s.	Steel	4300	5000	300 0	46 0	20 6	Glasgow	Napier	1883	86,763	58,435	10 6-in., 4 3-pdr. Q.F., 11 M., 2 l.	4 l. car.	16·6	1000	11,000
Gun Boat (1st class)	Pheasant	*Comp.*	755	1200	165 0	29 0	11 4	Devonp'rt	Devonport	1888	x27,800	y10,000	6 4-in. 25-cwt., 4 M.	..	13·25	105	2500
Cruiser (3rd class) P. 2"–1"	Philomel 2 s.	Steel	2575	7500	265 0	41 0	15 6	Devonp'rt	Earle	1890	Total. 156,102		8 4·7-in. Q.F., 8 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
" " P. 2"–1"	Phœbe 2 s.	Steel	2575	7500	265 0	41 0	15 6	Devonp'rt	Devonport	1890	Total. 161,154		8 4·7-in. Q.F., 8 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Gun Boat (1st class)	Pigeon	*Comp.*	755	1200	165 0	30 0	11 4	Pembroke	Barrow	1888	x27,800	y10,000	6 4-in., 4 M.	..	13·25	105	2500
" "	Pigmy	*Comp.*	755	1200	165 0	30 0	11 4	Sheerness	Barrow	1888	28,000	9,700	6 4-in., 4 M.	..	13·25	105	2500
Cruiser (2nd class) P. 2"–1"	Pique 2 s.	Steel copper sheathed	3600	9000	300 0	43 8	17 6	Jarrow	Palmer	1890	Total. 184,108		2 6-in., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
Gun Boat (1st class)	Plover	*Comp.*	755	1200	165 0	30 0	11 4	Pembroke	Barrow	1888	28,000	9,700	6 4-in., 4 M.	..	13·25	105	2500
Torpedo Ram P. 3"–2"	Polyphemus 2 s.	Steel	2640	5520	240 0	40 0	20 0	Chatham	Humphrys	1881	114,000	60,450	6 6-pdr. Q.F., 2 M.	5 f. tu. subm.	18·0	300	3400
Cruiser (3rd class)	Porpoise 2 s.	Steel	1770	3500	225 0	36 0	14 6	Glasgow	Thomson	1886	x55,916	y31,667	6 6-in., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	16·5	475	7000
Cruiser (1st class) P.	Powerful 2 s.	Steel copper sheathed	14,200	25,000	500 0	71 0	27 0	Barrow	Barrow	Bldg	..	..	2 9·2-in., 12 6-in. Q.F., 16 12-pr. do., 10 3-pdr. do., 9 M., 2 l.	4 f. tu. (sub.)	22·0	3000	..
Cruiser (3rd class) pp. 1¼"	Pylades	*Comp.*	1420	1400	200 0	38 0	15 9	Sheerness	Laird	1884	45,500	16,500	14 5-in., 8 M., 1 l.	..	12·6	400	6400
Sloop	Racer	*Comp.*	970	850	167 0	32 0	14 0	Devonp'rt	Hawthorn	1884	37,000	12,000	8 5-in., 8 M., 1 l.	..	11·50	150	2300
Cruiser (3rd class)	Racoon 2 s.	Steel	1770	4500	225 0	36 0	13 6	Devonp'rt	Harland	1887	x60,606	y31,000	6 6-in., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	17·5	475	7000
Cruiser (2nd class) P. 2"–1"	Rainbow 2 s.	Steel copper sheathed	3600	9681	300 0	43 8	17 6	Jarrow	Palmer	1891	Total. 184,086		2 6-in., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M, 1 l.	2 f. tu. 2 l. car.	19·7	400	8000
" "	Raleigh	Iron copper sheathed	5200	4200	298 0	49 0	24 7	Chatham	Humphrys	1873	147,248	46,138	8 90-cwt. M.L.R., 8 6-in., 8 5-in., 12 M., 4 l.	2 l. car.	13·9	550	2100
Gun Vessel (2nd class)	Rambler (Surveying service)	*Comp.*	835	650	157 0	29 6	13 7	Glasgow	Elder	1880	26,625	10,418	4 20-pdr., 1 M., 1 l.	..	10·66	40	1050
Cruiser (3rd class) pp. 1¼"	Rapid	*Comp.*	1420	1400	200 0	38 0	15 9	Devonp'rt	Maudslay	1883	52,107	16,119	2 6-in., 10 5-in., 4 M., 1 l.	..	12·6	400	6000
Gun Boat (1st class)	Rattler	*Comp.*	715	1200	165 0	29 0	11 0	Elswick	Hawthorn	1886	x28,134	y10,600	6 4-in., 4 M.	..	13·6	105	2500
1st Class or Torpedo Gun Boat	Rattlesnake 2 s.	Steel	550	2700	200 0	23 0	8 0	Birkenh'd	Laird	1886	x21,425	y14,000	1 4-in., 6 3-pdr. Q.F.	2 f. tu. 2 l. car.	18·5	100	3050
Gun Boat (2nd class)	Raven	*Comp.*	465	360	125 0	23 6	10 0	Poplar	Rennie	1882	14,800	6,250	2 64-pdr. M.L.R., 2 20-pdr., 2 M.	..	9·5	40	..
Gun Boat (1st class)	Redbreast	*Comp.*	805	1200	165 0	31 0	11 7½	Pembroke	Earle	1888	29,400	9,300	6 4-in., 4 M.	..	13·0	105	2500
" "	Redpole	*Comp.*	805	1200	165 0	31 0	11 7½	Pembroke	Earle	1888	29,400	9,300	6 4-in., 4 M.	..	13·0	105	2500
Gun Boat (2nd class)	Redwing (Tender)	*Comp.*	461	360	125 0	23 6	10 0	Pembroke	Maudslay	1880	16,400	5,800	2 20-cwt., 2 M.	..	9·68	40	..
Sloop	Reindeer	*Comp.*	970	850	167 0	32 0	14 0	Devonp'rt	Hawthorn	1883	34,834	52,787	6 5-in., 8 M., 1 l.	..	11·5	150	3200
1st Class or Torpedo Gun Boat	Renard 2 s.	Steel	810	3962	230 0	27 0	8 9	Birkenh'd	Laird	1892	Total. 53,848		2 4·7 in. Q.F., 4 3-pdr. do.	5 f. tu. or 1 car	19·25	100	2500

x Includes Gun Mountings, &c.

y Propelling Machinery.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
Cruiser (2nd class) . P. 2″–1′	Retribution 2 s.	Steel copper sheathed	3600	9000	300 0	43 8	17 6	Jarrow	. Palmer	. 1891	Total. 183,975		2 6-in., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75	400	8000
Cruiser (3rd class) . P. 2″–1″	Ringarooma 2 s. (Special for Australia)	Steel	2575	7500	265 0	41 0	15 6	Glasgow .	Thomson .	1890	Total. 128,076		8 4·7-in. Q.F., 8 3-pdr. Q.F., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Gun Boat (1st class) . .	Ringdove .	Comp.	805	1200	165 0	31 5	11 7½	Devonp'rt	Devonport	1889	Total. 39,753		6 4-in., 2 3-pdr. Q.F., 2 M.	..	13·0	105	2500
Cruiser (1st class) . P. 5″–1″	Royal Arthur 2 s.	Steel copper sheathed	7700	12,000	360 0	60 0	23 9	Portsm'th	Maudslay .	1891	Total. 402,414		1 22-ton B.L.R., 12 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do., 7 M., 2 l.	4 tu. (2 sub. 2 tr.)	19·7	850	10,000
Cruiser (3rd class) . pp. 1¼″	Royalist . .	Comp.	1420	1400	200 0	38 0	15 9	Devonp'rt	Maudslay .	1883	52,134	16,039	2 6-in., 10 5-in., 4 M. l.	..	12·6	400	6000
„ „ .	Ruby . .	Comp.	2120	1800	220 0	40 0	18 8	Hull	. Earle	. 1876	66,113	27,003	12 64-pdr. M.L.R., 6 M., 1 l. .	..	12·28	260	2080
Cruiser (1st class) . P. 5″–1″	St. George 2 s.	Steel copper sheathed	7700	12,000 (a) 10,536	360 0	60 8	23 9	Hull .	. Maudslay .	1892	Total. 377,204		2 22-ton, 10 6-in. Q.F., 12 6-pdr. do., 5 3-pdr. do., 7 M., 2 l.	4 tu. (2 sub. 2 tr.)	19·7	850	10,000
1st Class or Torpedo Gun Boat .	Salamander 2 s.	Steel	735	(b) 3500	230 0	27 0	8 3	Chatham .	Maudslay .	1889	Total. 57,911		2 4·7-in. Q.F., 4 3-pdr. Q.F. .	5 f. tu. or l. car	20·0	100	2500
„ „ .	Sandfly 2 s.	Steel	525	2700	200 0	23 0	8 9	Devonp'rt	Maudslay	1887	x22,877	y13,290	1 4-in., 6 3-pdr. Q.F. .	2 f. tu. 2 l. car.	19·0	80	2400
Cruiser (2nd class) . P. 2″–1″	Sappho . .	Steel	3400	9861	300 0	43 0	16 6	Poplar	. Penn	. 1891	Total. 171,853		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·47	400	8000
Cruiser (3rd class) . pp. 1¼″	Satellite . .	Comp.	1420	1400	200 0	38 0	15 9	Sheerness	Humphrys .	1881	47,500	15,400	2 6-in., 6 5-in., 4 M., 1 l. .	..	12·6	400	6000
„ „ .	Scout . 2 s.	Steel	1580	3200	220 0	34 0	14 6	Glasgow .	Thomson .	1885	x63,916	y23,600	4 5-in., 8 3-pdr. Q.F., 2 M., 1 l.	3 f. tu. (1 sub.) 4 l. car.	16·7	450	6900
Cruiser (2nd class) . P. 2″–1″	Scylla . 2 s.	Steel	3400	9280	300 0	43 0	16 6	Poplar	. Penn	. 1892	171,593		2 6-in. Q.F., 6 4·7-in. do. 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·62	400	8000
1st Class or Torpedo Gun Boat .	Seagull . 2 s.	Steel	735	(b) 3500	230 0	27 0	8 3	Chatham .	Maudslay .	1889	Total. 56,922		2 4·7-in., 4 3-pdr. Q.F. .	5 f. tu. or l. car	20·0	100	2500
Cruiser (2nd class) . P. 3″–2″	Severn . 2 s.	Steel	4050	6000	300 0	46 0	19 6	Chatham .	Humphrys .	1885	x 151,681	y 60,940	2 15-ton, 10 6-in., 3 6-pdr. Q.F., 2 3-pdr. do., 10 M., 2 l.	1 tu. sub 2 l. car.	17·3	900	8750
1st Class or Torpedo Gun Boat	Sharpshooter 2 s.	Steel	735	(b) 3500	230 0	27 0	8 3	Devonp'rt	Bellis	. 1888	x 29,675	y 20,354	2 4·7-in. Q.F., 4 3-pdr. do. .	5 f. tu. or l. car	20·0	100	2500
„ „ .	Sheldrake 2 s.	Steel	735	(b) 3500	230 0	27 0	8 3	Chatham .	Maudslay .	1889	Total. 57,800		2 4·7-in. Q.F., 4 3-pdr. do. .	5 f. tu. or l. car	20·0	100	2500
Cruiser (2nd class) . P. 2″–1″	Sirius . 2 s.	Steel copper sheathed	3600	9000	300 0	43 8	17 6	Elswick .	Maudslay .	1890	Total. 186,649		2 6-in., 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car	19·75	400	8000
1st Class or Torpedo Gun Boat	Skipjack . 2 s.	Steel	735	(b) 3500	230 0	27 0	8 3	Chatham .	Laird	. 1889	Total. 59,531		2 4·7-in. Q.F., 4 3-pdr. do. .	5 f. tu. or l. car	20·0	100	2500
„ „ .	Spanker . 2 s.	Steel	735	(b) 3500	230 0	27 0	8 3	Devonp'rt	Bellis	. 1889	Total. 50,000		2 4·7-in. Q.F., 4 3-pdr. do. .	5 f. tu. or l. car	20·0	100	2500
Gun Boat (1st class) . .	Sparrow . .	Comp.	805	1200	165 0	31 0	11 7½	Greenock	Greenock	1889	Total. 39,000		6 4-in., 2 3-pdr. Q.F., 2 M.	..	13·00	105	2500
Cruiser (2nd class) . P. 2″–1″	Spartan . 2 s.	Steel copper sheathed	3600	9000	300 0	43 8	17 6	Elswick .	Maudslay .	1891	Total. 186,351		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	19·75 20·44 trial.	400	8000
1st Class or Torpedo Gun Boat	Speedwell 2 s.	Steel	735	(b) 3500	230 0	27 0	8 3	Devonp'rt	Laird	. 1889	Total. 52,000		2 4·7-in. Q.F., 4 3-pdr. do. .	5 f. tu. or l. car	20·0	100	2500
„ „ .	Speedy . 2 s.	Steel	810	4703	230 0	27 0	8 9	Chiswick	Thornycrft	1893	Total. 58,927		2 4·7-in. Q.F., 4 3-pdr. do. .	5 f. tu. or l. car	20·25	100	..

x Includes Gun Mountings, &c. y Propelling Machinery. (a) Trials.
(b) The intended horse-power with forced draught was 4500, and the speed 21 knots.

GREAT BRITAIN.—Unarmoured Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Indicated Horse-Power.	Length.	Beam.	Draught of Water.	Where Built.	Maker of Engines.	Date of Launch.	Cost. Hull.	Cost. Machinery.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Speed.	Coal Endurance. Coal that can be carried in Bunkers.	Coal Endurance. Distance that can be steamed at 10 knots speed.
			Tons.		ft. in.	ft. in.	ft. in.				£	£			knots.	tons.	knots.
1st Class or Torpedo Gun Boat	Spider . 2 s.	Steel	525	3000	200 0	23 0	8 9	Devonp'rt	Maudslay	1887	x23,000	y13,300	1 4-in., 6 3-pdr. Q.F.	2 f. tu. 2 l. car.	19·0	80	2400
Gun Boat (2nd class)	Starling .	Comp.	465	360	125 0	23 6	10 0	Poplar	Rennie	1882	14,850	6,250	2 64-pdr. M.L.R., 2 20-pdr., 2 M.	..	9·5	40	..
" "	Stork (Surveying Vessel)	Comp.	465	360	125 0	23 6	10 0	Poplar	Rennie	1882	14,900	6,250	1 M., 2 l.	..	9·5	40	..
Despatch Vessel	Surprise 2 s.	Steel	1650	3030	250 0	32 6	14 0	Jarrow	Palmer	1885	x49,084	y29,680	4 5-in., 4 6-pdr. Q.F., 2 M.	..	17·0	400	6450
Sloop	Swallow . 2 s.	Comp.	1130	1570	195 0	28 0	11 6	Sheerness	Rennie	1885	44,797	15,000	8 5-in., 8 M.	..	13·5	280	5000
Gun Vessel (2nd class)	Swift . 2 s.	Comp.	756	870	165 0	29 0	10 11	Blackwall	Rennie	1879	24,290	10,380	2 90-cwt. M.L.R., 4 6-pdr. Q.F., 2 M.	..	11·81	180	2400
Cruiser (2nd class) P. 2″–1″	Sybille . 2 s.	Steel	3400	9496	300 0	42 0	16 6	Stephenson.	Hawthorn.	1890	Total. 174,670		2 6-in., 6 4·7-in. Q.F., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000
Cruiser (2nd class) P.	Talbot . 2 s.	Steel copper sheathed.	5600	9600	350 0	53 6	20 6	Devonp'rt	Devonport	Bldg.	..	..	5 6-in. Q.F., 6 4·7-in. do., 8 12-pdr. do., 1 3-pdr. do., 4 M., 1 l.	3 f. tu. (2 sub.)	19·5	550	..
Cruisers (2nd class) P.	Talbot class (6) 2 s.	Steel copper sheathed	5600	9600	350 0	54 0	20 6	By Contract		Pro.	..	..	5 6-in. Q.F., 6 4·7-in. do., 8 12-pdr. do., 1 3-pdr. do., 4 M., 1 l.	3 f. tu. (2 sub.)	19·5	550	..
Cruiser (3rd class)	Tartar . 2 s.	Steel	1770	3500	225 0	36 0	14 3½	Glasgow	Thomson	1886	x55,916	y31,667	6 6-in., 8 3-pdr. Q.F., 2 M., 1 l.	1 f. tu. 2 l. car.	16·5	325	4850
" " P. 2″–1″	Tauranga 2 s. (Special for Australia)	Steel	2575	7500	265 0	41 0	15 6	Glasgow	Thomson	1889	Total. 128,101		8 4·7-in. Q.F., 8 3-pdr. Q.F., 4 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Cruiser (2nd class) P. 2″–1″	Terpsichore 2 s.	Steel	3400	9000	300 0	43 0	16 6	Glasgow	Thomson	1890	Total. 173,341		2 6-in. Q.F., 6 4·7-in. do. 8 6-pdr. do., 1 3-pdr. do.	2 f. tu. 2 l. car.	20·0	400	8000
Cruiser (1st class) P.	Terrible .	Steel copper sheathed	14,200	25,000	500 0	71 0	27 0	Glasgow	Thomson	Bldg.	..	..	2 9·2-in., 12 6-in. Q.F., 16 12-pdr. do., 10 3-pdr. do., 9 M., 2 l.	..	22·0	1500 3000	..
Cruiser (2nd class) P. 3″–2″	Thames . 2 s.	Steel	4050	5700	300 0	46 0	19 6	Pembroke	Penn	1885	151,952	53,500	2 15-ton, 10 6-in., 3 6-pdr. Q.F., 8 3-pdr. do., 6 M., 2 l.	2 l. car.	16·8	900	8750
Cruiser (1st class) P. 5″–1″	Theseus . 2 s.	Steel	7350	12,000 10,608 trial.	360 0	60 0	23 9	Blackwall	Maudslay	1892	Total. 347,577		2 22-ton, 10 6-in. Q.F., 12 6-pdr., and 5 3-pdr. do., 7 M., 2 l.	4 tu. (2 sub. 2 tr.)	20·0	850	10,000
Cruiser (2nd class) P. 2″–1″	Thetis . 2 s.	Steel	3400	9000	300 0	43 0	16 6	Glasgow	Thomson	1890	Total. 173,146		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000
Gun Boat (1st class)	Thrush .	Comp.	805	1200	165 0	31 0	11 7½	Greenock	Greenock F'ndry Co.	1889	Total. 39,000		6 4-in. 25-cwt., 2 3-pdr. Q.F., 2 M.	..	13·0	105	2500
Sloop	Torch .	Steel copper sheathed.	960	1400	180 0	32 6	11 6	Sheerness	Sheerness	Bldg.	Total. 59,566		6 4-in. 25-pdr. Q.F., 4 3-pdr. do., 2 M.	..	13·25	130	..
Cruiser (3rd class)	Tourmaline .	Comp.	2120	1820	220 0	40 0	18 8	Midd'sbro	Hawthorn.	1875	69,99	25,771	4 6-in., 8 5-in. 38-cwt., 8 M., 2 l.	..	12·2	280	2000
Cruiser (2nd class) P. 2″–1″	Tribune . 2 s.	Steel	3400	9000	300 0	43 0	16 6	Glasgow	Thomson	1891	Total. 173,006		2 6-in. Q.F., 6 4·7-in. do., 8 6-pdr. do., 1 3-pdr. do., 4 M., 1 l.	2 f. tu. 2 l. car.	20·0	400	8000
Torpedo Vessel	Vesuvius 2 s.	Iron	245	350	90 0	22 0	8 6	Pembroke	Maudslay	1874	10,522	7,465	Nil	4 tu.	9·71	25	..
Cruiser (2nd class)	Volage .	Iron copper sheathed	3080	2400	270 0	42 0	22 0	Blackwall	Ravenhill	1874	91,817	41,000	10 6-in., 2 64-pdr. M.L.R., 10 M., 2 l.	2 l. car.	12·8	420	1850
Torpedo Depôt Ship. P. 5″–2½″	Vulcan . 2 s.	Steel	6620	12,032	350 0	58 0	23 0	Portsm'th	Humphrys	1889	Total. 370,447		8 4·7-in. Q.F., 12 3-in. Q.F., 16 M., 1 l.	2 f. tu. 4 l. car.	20·0	1000	12,000
Cruiser (3rd class) P. 2″–1″	Wallaroo 2 s. (Special for Australia)	Steel	2575	7500	265 0	41 0	15 6	Elswick	Hawthorn.	1889	Total. 115,995		8 4·7-in. Q.F., 12 3-pdr. do., 16 M., 1 l.	2 f. tu. 2 l. car.	19·0	300	4800
Gun Boat (2nd class)	Watchful .	Comp.	560	500	135 0	26 0	11 6	Birkenh'd	Lairds	1883	Total. 32,527		2 5-in., 2 4-in., 2 M., 2 l.	..	11·0	85	..
Gun Boat (1st class)	Widgeon 2 s.	Comp.	805	1200	165 0	30 0	11 7½	Pembroke	Rennie	1889	Total. 39,315		6 4-in. 25-cwt., 2 3-pdr. Q.F., 2 M.	..	13·0	105	2500
Sloop	Wild Swan .	Comp.	1130	800	170 0	36 0	15 10	Glasgow	Hawthorn.	1876	39,643	11,853	2 6-in., 6 5-in., 2 3-pr. Q.F., 2 M., 1 l.	..	11·35	150	1120
Gun Boat (2nd class)	Wrangler .	Comp.	465	360	125 0	23 6	10 6	Barrow	Barrow	1880	17,267	5,460	2 64-pdr. M.L.R., 2 20-pdr., 2 M.	..	9·88	40	..

x Includes Gun Mountings, &c. y Propelling Machinery.
(a) The intended horse-power with forced draught was 4500, and the speed 21 knots.

Paddle Wheel Vessels.—Adventure, Alecto, Cockatrice, Dove, Herald, Mosquito, Pioneer, Research (surveying vessel), Sphinx, Vigilant.
Twin Screw Gun Boats (Iron).—Dee, Don, Esk, Medina, Medway, Sabrina, Slaney, Spey, Tay, Tees, Trent, Tweed, 373 tons; 320 to 410 I.H.P.
Twin Screw Iron or Steel Gun Boats (*Staunch Type*).—Ant, Arrow, Badger, Blazer, Bloodhound, Bonnetta, Bouncer, Bulldog, Bustard, Comet, Cuckoo, Fidget, Gadfly, Griper, Hyena, Insolent, Kite, Mastiff, Pickle, Pike, Pincher, Plucky, Scourge, Snake, Snap, Staunch, Tickler, Weasel, 180 to 254 tons; 130 to 270 I.H.P.

Royal Naval Reserved Merchant Cruisers.

	Name.	Owners.	Length.	Breadth.	Maximum Draught of Water for the Admiralty List.	Gross Tonnage.	Indicated Horse-Power.	Ocean Speed.
			Feet.	Feet.	Feet.	Tons.		Knots.
Ships in receipt of an Annual subvention and permitted to fly the blue ensign.	Etruria	Cunard Company	501·5	57·2	26	8,120	14,500	19½
	Umbria	" "	501·5	57·2	26	8,128	14,500	19½
	Victoria	Peninsular and Oriental Co.	466	52	22½	6,091	7,000	16
	Britannia	" " "	466	52	22½	6,061	7,000	16
	Oceana	" " "	466	52	22½	6,188	7,000	16
	Majestic . 2 s.	White Star Company	565	58	24½	9,933	16,000	20
	Teutonic . 2 s.	" "	565	58	24½	9,952	17,000	20
	Empress of India . 2 s.	Canadian Pacific Railway Co.	440	51	24½	5,905	10,000	16
	Empress of China . 2 s.	" " "	440	51	24½	5,905	10,000	16
	Empress of Japan . 2 s.	" " "	440	51	24½	5,905	10,000	16
Ships held at the disposition of the Admiralty without subsidy.	Britannic	White Star Company	455	45·2	25	5,004	5,200	16
	Germanic	" "	455	45·2	25	5,008	5,200	16
	Adriatic	" "	437·2	40·9	23	3,888	3,600	15
	Servia	Cunard Company	515	52·1	26	7,392	10,000	16½
	Gallia	" "	430	44·6	24	4,809	5,300	15½
	Arcadia	Peninsular and Oriental Co.	466	52	22½	6,188	7,000	16
	Valetta	" " "	420·4	45·1	22½	4,904	5,000	15
	Massilia	" " "	420·4	45·1	22½	4,902	5,000	15
	Rome	" " "	430	44·4	22½	5,545	5,500	15
	Carthage	" " "	430	44·4	22½	4,879	5,000	15
	Ballarat	" " "	420·2	43	22½	4,748	4,500	14
	Parramatta	" " "	420·2	43	22½	4,756	4,500	14

There are also numerous ships on the Admiralty List complying with Admiralty conditions as to subdivision which have no national tie. They are suitable for receiving an armament, but there is no arrangement with Owners, except the promise of preference for occasional State employment.

GREATER BRITAIN.—Unarmoured Ships.

To what Government belonging.	Class of Ship.	Name.	Material of Construction.	Propellers.	Where Built.	When Launched.	Length.	Breadth.	Draught of Water.	Displacement.	Indicated Horse-Power.	Speed.	Coal Stowage.	Armament.
							ft. in.	ft. in.	ft. in.				tons.	
INDIA	1st class or Torpedo Gunboat	Assaye .	Steel	2	Elswick	1891	230 0	27 0	8 3	735	4,500	21·0	100	2 4·7-in. Q.F., 4 3-pr. do., 1 f. tu. & 2 l. car.
INDIA	Despatch Vessel	Lawrence .	Steel	Pad.	B'kenh'd	1886	212 2	32 2	18 3	1,154	1,277	13·5	270	Four 4-inch B.L.R., 4 6-pr. Q.F., 4 M.
INDIA	1st class or Torpedo Gunboat	Plassy .	Steel	2	Elswick	1890	230 0	27 0	8 3	735	4,500	21·0	100	2 4·7-in. Q.F., 4 3-pr. do., 1 f. tu. & 2 l. car.
VICTORIA.	Gunboat	Albert .	Steel	2	..	1883	115 0	25 0	10 0	350	400	10·0	..	One 8-in. 12-ton; 1 6-in. 4-ton; 2 9-prs.; 2 1-in. Nordenfelts.
VICTORIA.	Gunboat	Victoria .	Steel	2	..	1883	140 0	27 0	11 0	530	800	12·0	..	One 8-in. 12-ton; 1 6-in.; 2 12½-pr.; 2 1-in. Nordenfelts.
QUE'NSLAND.	Gun-vessel	Gayundah	Steel	2	Glasgow	1884	115 0	25 0	10 0	450	400	10·0	..	One 8-in. 11½-ton; one 6-in. 4-ton; one 3-pr. Q.F.; two Nordenfelts.
QUE'NSLAND.	Gun-vessel	Paluma .	Steel	2	Glasgow	1884	115 0	25 0	10 0	450	400	10·0	..	One 8-in. 11½-ton; one 6-in. 4-ton; one 3-pr. Q.F.; two Nordenfelts.
SOUTH AUSTRALIA	Cruiser	Protector .	Steel	2	..	1884	188 0	30 0	12 6	920	1,640	14·0	..	One 8-in. 11½-ton; five 6-in. 4-ton; five Gatlings.

Victoria has also four Iron Gunboats (Batman, Fawkner, Gannet, Lady Loch) of 336 to 387 tons displacement, and 350 to 500 Ind. H.P., and each armed with one 6-in. 4-ton gun and two machine guns.

Queensland has also three Steel Gunboats (Otter, Bonito, Stingaree) of 290 to 450 tons displacement, and 400 to 460 Ind. H.P., each armed with one 64-pr. M.L.R.

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(The five special second-class Cruisers, and the two Torpedo-Gunboats of the Sharpshooter class for Australia, are included in the alphabetical list of Ships of the Royal Navy, as well as the armour-clads, Abyssinia, Cerberus, and Magdala.)

ARGENTINE REPUBLIC.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Battery. or Turret.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. At ten knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
c.b.	Almirante Brown (steel)	4200	240 0	50 0	20 6	2	4500	9 (comp.)	8 (comp.)	11 & 8 1½″	8 8-in. 11½-ton, 6 4·7-in. Q.F., 2 3-pdr. do., 6 M.	2 f. tu. or l. car	1880	..	13·75	650	4300
c.s.t.	Andes (*a*)	1535	186 0	44 0	9 6	2	750	6	8	11⅞ 1″	2 11-in. 26-ton, 2 4½-in., 4 M.	..	1875	..	9·05	120	2880
c.d.s.	Independencia	2300	230 0	44 4	13 0	2	3000	8 (comp.)	8 (comp.)	..	2 24-c.m. (Krupp), 4 12-c.m. Q.F., 4 3-pdr. do., 4 M.	2 f. tu. or l. car	1891	..	14·4	340	4500
c.d.s.b.	Libertad	2300	230 0	44 4	13 0	2	3000	8 (comp.)	8 "	..	2 24-c.m. (Krupp), 4 12-c.m. Q.F., 4 3-pdr. do., 4 M.	2 f. tu. or l. car	1890	..	14·3	340	4500
c.d.s.t.	Plata	1535	186 0	44 0	9 6	2	750	6	8 "	11⅜ 1″	2 11-in. 26-ton, 2 4½-in. do., 2 l., 4 M.	..	1874	..	9·05	120	2880

(*a*) Run ashore. (?) Total wreck.

Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. At ten knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
to.g.b.	Aurora	500	203 6	20 0	13 9	2	2300	Steel	2 12-c.m. Q.F., 4 47-m.m. do.	3 l. car.	1892	..	18·0	..	..
g.v.	Argentina	820	192 0	27 0	13 0	1	850	Steel	1 6-in., 6 7-c.m. Krupp, 4 M.	..	1883	..	12·0	220	..
to.g.b.	Espora	520	210 0	25 0	8 0	2	3250	Steel	3 14-pdr. 3-in. Q.F., 4 3-pdr. do., 2 M.	5 l. car.	1890	..	20·0	100	2,500
cr.	Nueve de Julio P. 4½″-1¾″	3570	354 0	44 0	..	2	14,350	Steel	4 6-in. Q.F., 8 4·7-in. do., 12 3-pdr. do., 12 1-pdr. do.	5 f. tu. or l. car	1892	..	22·74	770	10,000
cr.	Patagonia	1530	220 0	32 10	12 9	2	2400	Steel & wood	1 10-in., 3 6-in., 6 l., 10 M.	..	1885	..	14·0	350	..
to.g.b.	Patria	1183	250 0	30 0	..	2	2500	..	2 47-m.m. Q.F., 4 8-in. do., 2 3-pdr.	5 l. car.	1893	..	18·0	..	..
g.v.	Parana	550	142 8	25 0	11 9	1	475	Iron	2 6-in., 2 4½-in.	..	1874	..	11·0	..	..
cr.	25 de Mayo P. 4½″-2″	3200	325 0	43 0	16 0	2	13,800	Steel 4½″-2″	2 21-c.m., 8 12-c.m. Q.F., 12 3 pdr. do., and 12 1-pdr. do.	3 l. car.	1890	..	22·43	600	10,000
g.v.	Uruguay	550	142 8	25 0	11 9	1	475	Iron	2 6-in., 2 4½-in.	..	1874	..	11·0	..	..

4 Gunboats (Rendel type), 416 tons, 420 I.HP.

AUSTRIA.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Battery or Turret.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Endurance. Coals that can be carried in Bunkers.	Coal Endurance. At 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
c.d.s.	A, B & C (New ships)	5510	..	..	..	..	9800	11	..	..	6 9·4-in., 5 4·7-in. Q.F., and smaller do.	..	Bldg.	..	17·5	..	..
c.b.	Custoza . (iron)	7060	302 3	58 0	24 6	1	4440	9	7	8¼ 1½″	8 26-c.m. 22-ton Krupp, 6 9-c.m. Uchatius, 11 M., 2 l.	..	1872	414,400	14·0	584	1624
c.b.	Don Juan de Austria (iron)	3550	240 3	50 0	20 0	1	2700	8	6	9¾ 1″	8 21-c.m. 10-ton Krupp, 6 9-c.m. Uchatius, 11 M., 2 l.	..	1875	..	13·0	380	2000
c.d.s.	Erzherzog Albrecht	5940	285 2	56 3	22 0	1	3600	9	7	9½	8 24-c.m. Krupp, 11 Q.F., and M.	..	1872	357,600	13·0	453	1472
c.b.	Kaiser . (wood)	5810	254 0	58 3	24 3	1	3200	6	5½	31	10 9-in. 12-ton Armstrong M.L.R., 6 9-c.m. Uch., 11 M., 2 l.	..	1871	337,200	13·0	450	1519
c.b.	Kaiser Max (iron)	3566	240 3	50 0	20 0	1	2700	8	6	9¾ 1″	8 21-c.m. 10-ton Krupp, 4 9-c.m. Uchatius, 11 M., 2 l.	..	1875	211,600	13·0	380	2000
River Monitor	Körös . (steel)	448	177 0	29 6	..	2	1250	..	..	.. 1″	2 12-c.m. Krupp, 2 Q.F., 2 M. .	..	1892	..	10·0	..	..
b.	Kronprinz Erzherzog Rudolph (steel)	6870	295 0	62 4	25 3	2	7500	12	11	.. 2¾″	3 30½-c.m. 48-ton Krupp, 6 12-c.m. do., 11 M., 2 l.	..	1887	330,000	16·0	600	..
b.	Kronprinzessin Erzherzogin Stefanie . (steel)	5060	278 10	55 9	21 6	2	8300	9	8	.. 1″	2 30½-c.m. 48-ton Krupp, 6 15-c.m. 5-ton do., 11 M., 2 l.	..	1887	300,000	17·0	400	..
River Monitor	Leitha (iron & steel)	310	166 0	27 6	3 7	2	320	1¾	2½ (turret)	7½ 1″	2 15-c.m. Wahrendorf, 2 M.	..	1871	20,000	8·0	20	..
Do.	New ship . (steel)	448	..	..	..		..	..	..	.. 1″	2 12-c.m. Krupp, 5 15-c.m. Q.F., 13 smaller do.	..	Bldg.	..	..	..	..
River Monitor	Maros (iron & steel)	310	166 0	27 6	3 7	2	320	1¾	2½ (turret)	7½ 1″	2 15-c.m. Wahrendorf, 2 M.	..	1871	20,000	8·0	20	..
c.b.	Prinz Eugen (iron)	3566	240 6	50 0	20 0	1	2700	8	6	9¾ 1″	8 21-c.m. 10-ton Krupp, 4 9-c.m. Uchatius, 11 M., 2 l.	..	1877	..	13·0	380	2000
River Monitor	Szamos . (steel)	448	177 0	29 6	..	2	1250	..	..	.. 1″	2 12-c.m. Krupp, 2 Q.F., 2 M. .	..	1892	..	10·0	..	..
c.b.	Tegetthoff (iron & steel)	7390	286 11	71 1	24 10	2	8300	14	14	9¾ 3″	6 24-c.m. Krupp 5 15-c.m. Q.F., 13 do.	..	1878	?247,378	16·3	670	3300

AUSTRIA.—Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coals Carried.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
g. v.	Albatros	570	150 11	26 3	11 2	1	340	wood	2 15-c.m. 3-ton Wahrendorf, 1 l.	..	1873	..	10·0	60	..
cr. 3rd class	Archduke Frederic	1570	173 10	39 5	16 9	1	780	wood	10 15-c.m. 3-ton Wahrendorf, 1 l.	..	1874	..	9·0	200	..
corv.	Aurora	1340	190 6	32 10	16 1	1	1000	composite	2 15-c.m. 3-ton Wahrendorf, 5 l., 2 M. or Q.F.	..	1873	..	11·0	160	..
to. g. b.	Blitz	360	193 6	22 4	8 0	..	2900	steel	9 Q.F.	..	1888	..	21·0	..	..
cr. 3rd class	Donau	2343	230 0	42 8	19 8	1	1800	composite	10 12-c.m. Uchatius, 4 M., 1 l.	..	1893	..	12·0	320	..
cr. 3rd class	Fasana	1970	223 3	39 5	16 9	1	1750	wood	4 15-c.m. 5-ton Krupp, 3 l., 2 Q.F.	..	1870	..	12·0	315	..
cr.	Frundsberg	1340	190 6	32 10	16 1	1	1000	composite	2 15-c.m. 3-ton Wahrendorf, 5 l., 2 M. or Q.F.	..	1873	..	11·0	160	..
cr. 2nd class P. 2¼″	Kaiserin Elizabeth	4064	321 6	47 6	18 7	2	9000	steel	2 24-c.m. 27-ton Krupp, 6 15-cm. 6-ton do., 11 Q.F., 2 l.	5 f. tu. or l.car	1890	..	19·0	660	4500
cr. 1st class P. 2¼″	Kaiserin Maria Teresa	5270	351 0	52 6	20 0	2	10000	steel	2 24-c.m. 27-ton Krupp, 10 15-c.m. Q.F., 13 smaller Q.F.	4 f. tu. or l.car	1893	..	19·0	660	4500
cr. 2nd class P. 2¼″	Kaiser Franz Joseph	4030	321 6	47 6	18 7	2	9000	steel	2 24-c.m. 27-ton Krupp, 6 15-cm. do., 11 Q.F., 2 l.	5 f. tu. or l.car	1889	..	19·0	660	4500
to. g. b.	Komet	360	193 6	22 4	8 0	..	2900	steel	9 Q.F.	..	1888	..	21·0	..	..
cr. 2nd class	Laudon	3430	253 0	46 0	20 8	1	2850	iron & wood	15 15-c.m. 5-ton Krupp, 7 Q.F. & M., 2 l.	..	1873	..	13·0	450	..
cr. 3rd class	Leopard	1582	224 0	34 0	14 0	2	6000	steel	2 12-c.m. 2¼-ton Krupp, 10 Q.F. & M.	4 tu. or l.car	1886	200,000	18·3	250	..
Torpedo vessel	Lussin	1011	200 4	26 3	12 2	2	1000	steel	2 15-c.m. 5-ton Krupp, 7 M., 1 l.	..	1883	..	14·0	200	..
to. g. b.	Meteor	350	187 0	22 4	8 0	2	2600	steel	9 Q.F.	f. tu. or l.car	1887	..	21·0	120	..
g. b.	Nautilus	570	150 11	26 3	11 2	1	410	wood	2 15-c.m. 3-ton Wahrendorf, 1 l.	..	1873	..	9·0	60	..
cr. 3rd class	Panther	1582	224 0	34 0	14 0	2	6000	steel	2 12-c.m. 2¼-ton Krupp, 10 Q.F. & M.	..	1885	..	18·5	250	..
Torpedo depôt-ship	Pelikan	2470	279 0	39 4	15 6	..	4700	steel	2 15 c.m. Uchatius, 8 Q.F.	4 f. tu. or l.car	1891	..	18·0	..	..
to. g. b.	Planet	500	210 0	23 0	8 3	2	3500	steel	10 Q.F.	1 l. car.	1889	..	19·6	..	..
cr. 2nd class	Radetzky	3430	253 0	46 0	20 8	1	2700	composite	15 15-c.m. 5-ton Krupp, 7 Q.F. & M., 2 l.	..	1872	..	14·0	450	..
cr. 3rd class	Saida	2440	233 4	42 8	19 1	1	1800	wood	11 15-c.m. 5-ton Uchatius, 1 l.	..	1878	..	12·0	320	..
to. g. b.	Satellit	540	220 6	26 9	..	2	4000	steel	9 Q.F.	..	1893	..	21·87	..	..
”	Sebenico	900	187 0	26 3	12 2	2	1200	steel	4 9-c.m. Uchatius, 2 M., 1 l.	..	1882	..	14·0	200	..
cr. 3rd class	Spalato	840	179 6	26 3	12 2	2	1200	steel	4 9-c.m. Uchatius, 7 M., 1 l.	..	1879	..	14·0	150	..
Torpedo cruiser	Tiger	1675	233 0	32 10	15 5	2	4000	steel	4 12-c.m. 2¼-ton, 10 M.	..	1887	..	18·0	300	..
to. g. b.	Trabant	530	210 0	23 0	8 3	2	3500	steel	10 Q.F.	1 l. car.	1890	..	20·0	..	..
Torpedo vessel	Zara (School ship)	850	179 6	26 3	12 2	2	1200	steel	4 9-c.m. Uchatius, 7 M., 1 l.	..	1879	..	14·0	150	..
corv.	Zrinyi	1340	190 6	32 10	16 1	1	1000	composite	2 15-c.m. 3-ton Wahrendorf, 5 l., 2 M. or Q.F.	..	1871	..	11·0	160	..

Old gunboats (probably ineffective) Albatross, Hum, Kerka, Narenta, Sansego. *Paddle-wheel vessels*, Andreas-Hofer, Fantasie, Greif, Miramar, Taurus.
A screw gunboat, the Grille, of 380 tons displacement and 300 indicated horse-power. Salamander, 265 tons, training vessel, building.

BRAZIL.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Battery or Turret.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
River Monitor.	Alagoãs . . (wood)	340	120 0	28 0	4 10	2	180	4½	4½	14½	1 70-pdr. Whitworth M.L.R.	..	1886	..	7·0	..	..
t.	Aquidaban (steel copper-sheathed)	4950	280 0	52 0	18 0	2	6200	11 comp.	11½ & 10 comp.	10 2″	4 9-in. 20-ton (Armstrong), 4 70-pdr. 5-ton do., 2 Q.F., 13 M.	5 f. tu. or l. car.	1885	345,000*	15·0	600	..
c.d.s., t.	Bahia . . (iron)	1000	178 0	35 0	8 6	2	1640	4½	5½	10⅝	2 7-in. M.L.R. (Whitworth), 2 M.	..	1865	..	10·0	..	..
c.d.s., c.b.	Brazil (a) . . (iron)	1518	179 8	35 0	12 5	1	1500	4½	4½	8 3″	4 7-in. M.L.R. (Whitworth), 4 68-pdr. do., 4 l., s b.	..	1864	60,000	11·3	..	..
c.d.s., t.	Lima-Barros (a) (iron)	1350	180 0	36 0	13 5	2	2100	4½	4½	8¼	4 7-in. Whitworth M.L.R. .	..	1866	..	12·0	200	..
River Monitor	Maranhao .	..	..	..	..	..	..	..	..	..	.. .. ..	..	Bldg.	..	..	..	..
c.d.s., c.b.	Mariz-e-Barros (iron)	1444	198 10	36 0	10 10	2	600	4½	4½	8	4 7-in. Whitworth M.L.R. .	..	1866	..	9·0	..	..
River Monitor	Pernambuco .	..	..	..	..	..	..	..	..	..	.. .. ..	..	Bldg.	..	..	..	..
River Monitor	Piauhy . . (wood)	340	120 0	28 0	4 10	2	180	4½	4½	14½	1 70-pdr. Whitworth M.L.R. .	..	1887	..	7·0	..	..
t.	Riachuelo (steel copper-sheathed)	5700	305 0	52 0	19 6	2	7300	11 comp.	11 & 10 comp.	10 2″	4 9-in. 20-ton (Whitworth, altered by Armstrong), 6 5½-inch 5-ton do., 15 M.	5 f. tu. or l. car.	1883	365,000*	16·71	800	4,500 (at 15 knots)
River Monitor	Rio Grande . (wood)	340	120 0	28 0	4 10	2	180	4½	4½	14½	1 70-pdr. Whitworth M.L.R. .	..	1888	..	7·0	..	..
c.b.	Sete de Setembro (wood) (b)	2145	219 10	46 6	12 6	2	2000	4½	4½	..	4 9-in. 18-ton Whitworth M.L.R., 5 M.	..	1874	..	12·0	..	..

* Exclusive of guns and ammunition.

(a) The Brazil and Lima-Barros are now used as Stationary Floating Batteries.

(b) Damaged by fire, December, 1893.

BRAZIL.—Unarmoured Ships.

Class.		NAME.	Displacement.	Length.		Beam.		Draught of Water.		Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
			tons.	ft.	in.	ft.	in.	ft.	in.							£	knots.	tons.	knots.
cr.	P. 1½″	Almirante Tamandare	4735	294	0	46	0	18	4	2	7500	steel (wood sheathed.)	10 15-c.m. Q.F., 2 12-c.m. do., 8 M.	..	1890	..	17·0	750	..
to.g.b.		Aurora	480	196	0	21	0	7	9	2	2300	steel (wood sheathed.)	2 20-pdr. Q.F., 4 3-in. do.	3 f. tu. or l. car	1893	..	18·0	150	..
cr.	P.	Benjamin Constant	2750	236	0	46	0	18	0	1	2800	steel (copper sheathed.)	4 6-in. Q.F., 8 4·7-in. do., 10 smaller do. and M.	4 f. tu. or l. car	1892	..	14·0	260	4000
”		Guanabára	1900	200	0	41	2	16	4	1	3000	wood	9 70-pdr. Whitworth, 6 M., 2 l.	..	1877	..	13·0	..	..
”		Marinheiro (used as a training vessel.)	726	167	0	26	3	11	0	1	750	composite	6 12-c.m., 1 9-c.m. do., 4 M.	..	1883	..	9·0	..	..
corv.		Nictheroy (*a*)	1800	192	0	41	0	16	0	1	1000	wood	12 70-pdr. Whitworth, 6 M.	..	1862	..	8·0	..	..
”		Parnahyba (Torpedo School ship)	838	170	6	26	3	11	2	1	900	composite	5 4·7 Armstrong, 4 M.	..	1878	..	10·0	..	..
cr.		Primeiro de Março	726	167	3	26	3	10	6	1	750	composite	7 4½-in. Whitworth, 4 M.	..	1881	..	9·0	..	..
”	P. 2″–1″	Republica	1300	210	0	35	0	13	0	2	3300	steel	6 4·7-in. Q.F., 4 6-pdr. do., 6 M.	2 f. tu. 2 l. car	1892	..	17·0	170	..
g.v.		Tiradentes	800	165	0	30	0	11	0	2	1200	steel (wood sheathed.)	4 4·7-in. Q.F., 3 6-pdr. do., 4 M.	2 l. car	1892	..	14·5	110	..
cr.		Trajano	1400	210	2	29	6	14	9	1	2400	composite	7 4·7-in. Armstrong, 4 M.	..	1873	..	13·0	..	..
”	P.	New ship	4500	..		..		..		..	5500	steel	4 8-in. 12-ton, 10 6-in., Q.F., 1 M.	..	Bldg.	..	17·0	..	..

(*a*) Stated to be condemned.

Double-screw Gunboats.—Guarany, Iniciadora, Traripe, 250 to 330 tons, 160 to 260 I.HP.; Marojo of 450 tons and 400 I.HP.
Four River-service Gunboats of 210 tons, 200 I.HP., and 8 knots speed.
Paddle River-service Gunboats.—Braconnot, Lamego, Manáos, Taquary.

CHILI.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Battery, Turret or Barbette.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
c.b.	Almirante Cochrane (iron)	3500	210 0	45 9	19 8	2	2920	9	8	7¾ 3"	6 8-in. 14-ton Arm., 4 6-pdr. Q.F., 4 3-pdr. do., 7 M.	3 f. tu. or l. car	1874	..	13·0	500	1900
b.	Capitano Prat (steel sheathed and coppered)	6900	328 0	60 8	21 10	2	12,000	12 steel schn.	4 10½ barbette.	.. 3"	4 24-c.m. (Canet), 8 12-c.m. Q.F. (Canet), 6 57-m.m. do., 4 47-m.m. do., 10 37-m.m. do., 5 M.	4 f. tu. or l. car	1890	391,000	18·3	400 1100	..
t.	Huascar . . (iron)	1800	200 0	35 0	15 6	1	1050	4½	5½	14 1½"	2 8-in. 13-ton, 2 4·7-in. Q.F., 3 M., 4 l.	..	1865	..	12·0	250	1100

Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
corv.	Abtao (used as a transport)	1370	227 0	29 6	15 6	1	1000	composite	1 70-pr. 4 6-pdr. and 3-pdr. Q.F., 4 M.	..	1864	..	9·0	300	..
to.g.b	Almirante Condell	750	240 0	27 6	9 6	2	4500	steel	3 14-pdr. Q.F., 4 3-pdr. do., 2 M.	5 l. car	1890	..	21·0	100	2500
to.g.b.	Almirante Lynch .	750	240 0	27 6	9 6	2	4500	steel	3 14-pdr. Q.F., 4 3-pdr. do., 2 M.	5 l. car	1890	..	21·0	100	2500
cr.	Blanco Encalada P. 4–1¾	4400	370 0	46 6	18 6	2	14,500	steel, C.T. 6-in.	2 8-in., 10 6-in. Q.F., 12 3-pdr. do., 12 1-pdr. do.	5 f. tu. or l. car	1893	..	22·5	900	..
"	Esmeralda . P. 1"	3000	270 0	40 0	18 3	2	6500	steel	2 10-in. 25-ton Armstrong, 6 6-in. 4-ton., 2 Q.F., 6 M.	3 f. tu. or l. car	1883	..	18·28	600	4000
gr.	Magellanes . .	800	190 0	28 0	14 9	2	1230	composite	2 6-in., 1 7-in. M.L.R., 6 M., 2 l. . .	..	1874	..	11·0	300	..
"	O'Higgins . .	1470	218 6	33 4	17 4	1	1200	wood	2 70-pdr., 2 12-pdr., 4 M. . .	..	1866	..	10·0	200	..
"	Pilcomayo . .	790	171 0	27 4	..	1	180 (nom.)	wood	2 70-pdr. B.L.R., 2 40-pdr. do. (all Armstrong), 3 M.	..	1874	..	9·0	200	..
cr.	Presidente Errázuriz P.	2080	268 0	35 9	19 6	2	5400	steel copper sheathed	4 15-c.m. Q.F. (Canet), 2 12-c.m. do., 4 57-m.m. do., 6 M.	3 l. car	1890	..	19·0	..	4500 at 12 knots
"	Presidente Pinto P.	2080	268 0	35 9	19 6	2	5400	steel copper sheathed	4 15-c.m. Q.F. (Canet), 2 12-c.m. do., 4 57-m.m. do., 6 M.	3 l. car	1890	..	19·0	..	4500 at 12 knots

Five Gunboats of 420 tons displacement and 7 to 10 knots speed.

CHINA.—Armoured Ships.

(The Chinese Navy is divided into Provincial Fleets: Canton, Foo-chow, Shang-hai, Peiho, and North Coast.)

Class.	NAME.		Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Turret or Barbette.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
			tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
b.	Chen-Yuen	(steel)	7430	308 5	59 0	20 0	2	6200	14 comp.	12 comp.	14 3″	4 30½-c.m. Krupp, 2 15-c.m. 4-ton do., 8 M., 2 l.	2 l. car.	1882	..	14·5	1000	..
b.	King-Yuen	(steel)	2850	270 0	40 0	16 6	2	3600	9½	8 comp.	3″	2 8¼-in. 10-ton, 2 6-in., 7 M.	1f.tu.sb. 3 l. car.	1887	..	16·5	325	..
c.d.s.	Ping-Yuen	(steel)	2850	200 0	40 0	16 0	2	2400	8	5 barbette and C. T.	.. 2″	1 10·2-in. Krupp, 2 6-in. do., 8 Q.F.	4 f. tu. or l. car	1890	..	10·5	..	..
b.	Lai-Yuen	(steel)	2850	270 0	40 0	16 6	2	3600	9½	8 comp.	.. 3″	2 8¼-in. 10-ton, 2 6-in. 4-ton, 7 M.	1f.tu.sb. 3 l. car.	1887	..	16·5	325	..
b.	Ting-Yuen	(steel)	7430	308 5	59 0	20 0	2	6200	14 comp.	12 comp.	14 3″	4 30½-c.m. Krupp, 2 15-c.m. 4-ton do., 8 M., 2 l.	2 l. car.	1881	..	14·5	1000	..
a.g.b.	Tien-Sing	(wood)	200	105 0	20 4	7 0	2	340	1⅛	3	5	1 17-c.m. Krupp	..	1875	..	10·0	..	..

Unarmoured Ships.

Class.	NAME.		Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
			tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
cr.	Chih-Yuen	P. 4″–2″	2300	250 0	38 0	15 0	2	5500	steel barb'tte 10″	3 8-in. 12-ton, 2 6-in. 4-ton., 7 57-m.m. Q.F., 2 47-m.m. do., 8 27-m.m. do., 6 M.	4 f. tu. or l. car	1886	..	18·0	450	..
,,	Ching-Yuen	P. 4″–2″	2300	250 0	38 0	15 0	2	5500	steel barb'tte 10″	3 8-in. 12-ton 2 6-in. 4-ton. do., 7 57-m.m.Q.F., 2 47-m.m.do., 8 27-m.m. do., 6 M.	4 f. tu. or l. car	1886	..	18·0	450	..
,,	Foo-Ching	P. 4″–2″	2500	253 0	36 2	18 0	2	2400	steel	3 21-c.m., 7 12-c.m. Krupp	..	1890	..	15·0	..	..
,,	Foo-Chow		1300	223 0	32 0	13 3	2	1600	steel	2 6-in. Armstrong, 4 l.	..	1887	..	13·0	..	..
cr.	Foo-Sing		2200	253 0	36 2	18 1	2	2400	steel	2 8-in. Armstrong, 8 4·7-in. Q.F., 4 M.	1 l. car.	1893	..	..	..	..
,,	Hai-An		2630	300 0	42 0	21 0	1	1750	wood	2 24-c.m. Krupp, 24 12-c.m. do., 4 M.	1 l. car.	1872	..	12·0	..	..
,,	Huan-Tai		1300	223 0	32 10	13 3	2	1600	steel	2 15-c.m. Krupp, 5 12-c.m. do., 4 M.	2 f. tu. or l.car	1888	..	15·0	..	..
,,	Kai-Chih		2480	259 0	39 4	15 2	..	3000	steel	2 21-c.m., 6 15-c.m., 6 M., 5 l.	..	1884	..	15·0	..	..
to. cr.	Kong-Bin		1100	..	..	..	2	3400	steel	1 15-c.m., 1 12-c.m., 4 M.	..	1891	..	..	..	..
,,	Kong-Hi		1100	..	..	..	2	3400	steel	1 15-c.m., 1 12-c.m., 4 M.	..	1891	..	..	..	..
cr.	Kuang Ki	P. 1″	1030	236 0	27 6	11 4	2	2400	steel and wood	3 12-c.m. Q.F., 8 M.	4 l. car.	1891	..	16·5	..	..
,,	Kuang King	P. 1″	1030	236 0	27 6	11 4	2	2400	steel and wood	3 12-c.m. Q.F., 8 M.	4 l. car.	1891	..	16·5	..	..
,,	Kuang Ting	P. 1″	1030	236 0	27 6	11 4	2	2400	steel and wood	3 12-c.m. Q.F., 8 M.	4 l. car.	1890	..	16·5	..	..
,,	Nan-Schuin		2200	253 0	36 2	18 1	2	2400	steel	2 8-in. Armstrong, 8 4·7-in. Q.F., 4 M.	1 l. car.	1884	..	15·0	..	..
,,	One new vessel		2200	253 0	36 2	18 1	2	2400	steel	2 8-in. Armstrong, 8 4·7-in. Q.F., 4 M.	..	Bldg.	..	15·0	..	..
,,	Nan-Thin		2200	253 0	36 2	18 1	1	2400	steel	2 8-in. Armstrong, 8 4·7-in. Q.F., 4 M.	1 l. car.	1883	..	15·0	..	..
,,	Tshao-Yong	pp.	1350	210 0	32 0	15 8	2	2677	steel	2 10-in. Armstrong, 4 4·7-in. Q.F., 7 M., 2 l.	3 f. tu. or l. car	1881	..	16·8	300	5380 (at 8 knots)
g.v.	Tshen-Hai		578	160 10	26 3	10 6	1	480	wood	1 6½-ton Armstrong M.L.R., 4 5-in.	..	1872	..	10·0	..	..
cr.	Tsi-Yuen	P. 4″–2″	2355	236 3	33 0	15 9	2	2800	steel	2 21-c.m. Krupp, 1 15-c.m. do., 9 M.	4 f. tu. or l. car	1883	..	15·0	230	..
g.v.	Tsing-Yuen		578	160 10	26 3	10 6	1	480	wood	1 6½-ton Armstrong, M.L.R., 4 5-in.	..	1872	..	10·0	..	..
cr.	Yang-Pao		2500	253 0	36 2	18 0	2	2400	steel	3 8-in. 10-ton, 7 4¾-in. Krupp	..	1883	..	15·0	..	..
,,	Yang-Wai	pp.	1350	210 0	32 0	15 8	2	2580	steel	2 10-in. 25-ton Armstrong, 4 4·7-in. Q.F., 7 M., 2 l.	3 f. tu. or l. car	1881	..	16·0	300	5370 (at 8 knots)
to. g.b.	(X.)		450	200 0	23 0	8 3	2	2700	steel	1 4-in., 4 M.	4 l. car.	1888	..	19·0	100	..
cr.	Ye-Sing		2500	253 0	36 0	18 0	1	2400	steel	3 8-in. 10-ton, 7 4¾-in. Krupp	..	1888	..	15·0	..	..

Gunboats (Rendel's System).—Eleven of 325 to 440 tons displacement, 235 to 450 indicated horse-power, named with letters of Greek alphabet.
Gunboats (Canton Flotilla).—Thirteen of 100 to 350 tons displacement.
Floating Batteries.—Six with 3 12-ton Armstrong guns in a wooden fixed turret for river service.

DENMARK.—Armoured Ships.

Class.	NAME.	Displacement.	Length.		Beam.		Draught of Water.		Propellers.	Indicated Horse-power.	Armour.		Back-ing.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
											Belt.	Battery or Turret.	Deck Plating.	Guns.	Fish Torpedo Dis-chargers					
		tons.	ft.	in.	ft.	in.	ft.	in.			inches.	inches.	inches.				£	knots.	tons.	knots.
ac.	Absalon . . (iron)	527	150	0	26	0	10	2	1	500	2½	2½	6	4 8·7-c.m. Krupp, 4 M. . .	..	1862	..	10·0	65	..
Torpedo School Ship	Esbern Snare . (iron)	527	150	0	26	0	10	2	1	500	2½	2½	6	2 M., 2 l.	2 f. tu. or l.car	1862	..	10·0	65	..
c.d.s., t.	Gorm . . . (iron)	2344	231	0	40	0	14	0	2	1670	7	8 turret	10	2 18-ton Armstrong M.L.R., 3 8·7-c.m. Krupp, 4 M.	..	1870	104,000	12·25	115	..
t.	Helgoland . . (iron)	5347	257	6	59	2	18	8	2	4000	12	10	10 2″	1 30½-c.m. 36-ton Krupp, 4 26-c.m. 22-ton do., 5 12-c.m. do., 10 M.	4 f. tu. or l.car	1878	275,000	12·0	230	1070
b.	Iver Hvitfeldt . (steel)	3260	242	0	49	6	18	0	2	5100	12	8 on barbettes	.. 2″	2 26-c.m. 28-ton Krupp, 4 12-c.m. do., 12 M.	4 f. tu. or l.car	1886	200,000	15·6	250	..
c.d.s., t.	Lindormen. . (iron)	2076	216	0	39	5	13	9	2	1560	5	5 turret	9¾	2 13-ton Armstrong M.L.R., 3 8·7-c.m. Krupp, 4 M.	..	1868	93,000	12·0	120	..
c.b.	Odin . . . (iron)	3083	237	0	50	0	15	6	1	2260	8	8	10	4 18-ton Armstrong M.L.R., 4 8·7-c.m. Krupp, 7 M.	..	1872	147,000	12·4	180	560
t.	Rolf Krake. . (iron)	1344	185	2	38	3	10	6	1	750	4½	4½	9 1″	2 9-ton Armstrong, 2 8·7-c.m. Krupp, 4 M.	..	1863	74,000	7·8	135	..
t.	Skjold . . (steel)	2150	226	6	38	0	13	5	..	2200	9	8-4½	.. 2″	1 24-c.m., 3 12-c.m. Krupp, 4 47-m.m. Q.F., 1 M.	..	Bldg.	..	13·0	..	..
Torpedo Ship	Tordenskiold . (steel)	2400	221	6	43	3	15	6	2	2600	..	8 (steel)	.. 4″–2″	1 52-ton Krupp, 4 12-c.m. do., 8 M.	4 f. tu. or l.car	1880	138,900	14·0	170	..

DENMARK.—Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Torpedoes.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
corv.	Dagmar (school ship) .	1193	173 10	33 10	16 0	1	800	wood	8 $5\frac{1}{2}$-in. $4\frac{3}{4}$-ton Krupp, 4 M. .	..	1861	50,000	9·5	150	..
g.v.	Diana	556	154 6	26 3	10 2	1	500	wood	6 87-m.m. Krupp, 2 M. . .	..	1863	33,000	9·0	60	..
"	Falster . . .	356	111 0	28 10	7 6	2	510	iron	1 20-ton Armstrong M.L.R., 2 87-m.m. Krupp, 2 M.	..	1873	33,000	9·8	20	..
cr.	Fyen . . . P. $1\frac{3}{4}''$	2596	226 6	45 6	18 1	1	2700	steel copper sheathed	4 15-c.m. $4\frac{3}{4}$-ton Krupp, 14 15-c.m. $3\frac{1}{2}$ ton do., 8 M.	2 f. tu. or l.car	1882	170,000	13·0	290	..
g.v.	Fylla	556	154 0	26 3	10 2	1	500	wood	6 87-m.m. Krupp, 2 M. . .	..	1862	33,000	9·0	60	..
cr. (3rd class)	Geiser . . . P. $1\frac{1}{2}''$	1280	257 6	27 6	..	2	3000	steel	2 4·7-in. Q.F., 4 57-m.m. do., 6 M. .	4 l. car.	1892	..	17·1	..	..
cr. (3rd class)	Heimdal . . P. $1\frac{1}{2}''$	1280	257 6	27 6	..	2	3000	steel	2 4·7-in. Q.F., 4 57-m.m. do., 6 M. .	4 l. car.	Bldg.	..	17·5	..	..
cr. (3rd class)	Hekla . . . P. $1\frac{1}{2}''$	1280	233 0	32 10	11 2	2	3000	steel	2 6-in. Q.F., 4 57-m.m. do., 6 M. .	4 l. car.	1890	..	17·0	..	..
g.v.	Ingolf	870	192 0	28 0	12 6	1	600	iron	2 15-c.m. Krupp, 4 87-m.m. do., 2 M.	..	1876	44,000	10·5	130	..
cr.	Jylland (reserve ship) .	2457	200 3	44 3	19 5	1	1350	wood	20 6-in. Finspong M.L.R., 6 12-c.m. Krupp, 4 M.	..	1860	84,000	11·0	260	..
g.v.	Moen	356	111 0	28 10	7 6	1	523	iron	1 20-ton Armstrong M.L.R., 2 87-m.m. Krupp, 2 M.	..	1875	..	9·2	20	..
corv.	Saint Thomas . .	1572	224 0	33 0	17 0	1	1870	wood	8 12-c.m. Krupp, 6 M. . .	..	1871	..	13·0	190	..
cr.	Valkyrien . . P. $2\frac{1}{2}''$	2900	268 0	43 6	18 0	2	5300	steel	2 21-c.m. 10-ton Krupp, 6 15-c.m. do., 4 Q.F., 10 M. . .	5 f. tu. or l.car	1887	..	17·0	450	..

Gunboats.—Five in number, of 150 to 240 tons, 200 to 400 I.HP.

FRANCE.—Armoured Ships.

Class.	NAME.	Displacement.	Length at Water Line.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Battery or Turret.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		A tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
a.g.b.	Achéron . (steel)	1640	181 0	40 4	11 10	2	1700	8	8	.. 2½"	1 27-c.m. 28-ton, 3 10-c.m. Q.F., 2 47-m.m. do., 4 M.	..	1885	100,000	13·0	100	..
b.	Amiral Baudin . (iron & steel)	11,380	321 6	69 10	26 2	2	8320	21½	16½ steel	14 4"	3 37-c.m. (75 ton), 4 16-c.m., 8 14-c.m. Q.F., 9 47-m.m. do., 14 M.	4 f. tu.	1883	600,000	15·0	800	3000
b.	Amiral Duperré (iron & steel)	10,487	311 0	66 11	26 9	2	8120	21½	15½	14 2¼"	4 34-c.m. (48 ton), 1 16-c.m., 14 14-c.m., 11 Q.F., 18 M.	4 f. tu. or l.car	1879	570,000	14·22	850	..
a.c.	Bayard . (wood)	5986	265 9	57 2	24 11	2	4538	10	8	15 2"	4 24-c.m. 16-ton, 2 19-c.m. 8-ton, 6 14-c.m., 3-ton, 2 65-m.m., 12 M.	..	1880	..	14·0	500	..
c.d.s., t.	Bélier (d) . (wood)	3590	217 0	53 0	19 1	2	1921	8½	7	31½	2 24-c.m. 16-ton, 4 M.	..	1870	..	12·37	250	..
c.d.s., t.	Bouledogue (d)(wood)	3500	217 0	53 0	18 2	2	1827	8½	7	31½	2 24-c.m. 16-ton, 4 M.	..	1872	..	12·25	250	..
t.	Bouvet . (steel)	12,200	382 3	70 3	27 7	3	13,000	"15¾ to 8"	..	.. 3½"	2 30-c.m., 2 27-c.m., 8-14 c.m. Q.F., 8 10-c.m. do., 12 47-m.m. do., 20 37-m.m.	5 f. tu. or l.car	Bldg.	979,340	17·5	621	..
t.	Bouvines . .	6610	284 0	58 8	22 0	2	8400	17¾-10"	14½ Turret base, 12½	.. 4"	2 30-c.m., 8 10-c.m. Q.F., 4 47-m.m. do., 10 37-m.m. do.	4 f. tu. or l.car	1892	535,000	17·0	300	..
t.	Brennus (steel)	11,000	361 0	67 0	26 3	2	14,000	15¾ comp. 4¾ above	15¾ comp. & 4-in. on battery.	.. 4¾"	3 34-c.m. 58-ton, 10 16-c.m. Q.F., 4 65-m.m. do., 8 47-m.m. do., 8 M.	5 f. tu. or l.car	1891	852,680	17·5	800	..
a.c.t.	Bruix . (steel)	4745	348 0	46 0	19 2	2	8300	3½	..	.. 2½"	2 19-c.m., 6 14-c.m. Q.F., 4 65-m.m. do., 6 47-m.m. do., 6 37-m.m. M.	..	Bldg.	352,592	19·0	413	..
b.	Caïman (iron and steel)	7200	278 3	59 0	24 7	2	6000	19½	17¾	12 3"	2 42-c.m. 75-ton, 4 10-c.m. Q.F., 2 47-m.m. do., 16 M.	..	1885	..	14·5	400	..
a.c.t.	Chanzy . (steel)	4745	348 0	46 0	19 2	2	8300	3½"	2"	.. 2"–1½"	2 19-c.m., 6 14-c.m. Q.F., 4 65-m.m. do., 6 47-m.m. do., 6 37-m.m. M.	5 f. tu. or l.car	1894	360,000	19·0	406	..
b.	Charlemagne (steel)	11,232	385 0	66 7	25 10	3	14,000	15¾ 3¼ above	15¾ 3"	.. 3½"&1½"	4 30-c.m., 10 14-c.m. Q.F., 6 10-c.m. do., 36 47-m.m. & 37-m.m. do.	6 f. tu. or l.car	Bldg.	960,000	18·0	..	..
t.	Charles Martel (steel)	11,882	392 6	71 3	26 3	2	13,500	17¾	15¾ 4-in. on upper works	.. 3½"	2 30-c.m., 2 27-c.m., 8 14-c.m. Q.F., 4 65-m.m. do., 12 47-m.m. do., 8 37-m.m. M.	6 f. tu. or l.car	1893	987,600	17·5	800	..
a.c.t.	Charner . (steel)	4745	348 0	46 0	19 2	2	8300	3½"	2"	.. 2"–1½"	2 19-c.m., 6 14-c.m. Q.F., 4 65-m.m. do., 6 47-m.m. do., 4 37-m.m. M.	5 f. tu. or l.car	1893	353,200	19·0	413	..
a.g.b.	Cocyte . (steel)	1640	181 10	40 4	11 10	2	1700	8	8	.. 2½"	1 27-c.m. 28-ton, 3 10-c.m. Q.F., 2 47-m.m. do., 4 M.	..	1887	100,000	13·0	100	..
c.b.	Colbert . (wood)	8457	317 9	56 6	28 5	1	4652	8½	6¼	34	8 27-c.m. 23-ton, 2 24-c.m. 16-ton, 6 14-c.m. 3-ton, 2 Q.F., 14 M.	..	1875	..	14·47	700	..
c.b. & b.	Courbet (iron & steel)	9652	312 0	67 0	25 0	2	8100	15	9½	.. 2½"	4 34-c.m. 48-ton, 4 27-c.m. 28-ton, 6 14-c.m. 3-ton, 2 Q.F., 18 M.	5 f. tu. or 1. car.	1881	800,000	15·4	900	3100
c.b. & b.	Dévastation (iron & steel)	9639	312 0	67 0	25 0	2	8320	15	9½	12½ 2½"	4 32-c.m. 48-ton, 4 27-c.m. 23-ton, 6 14-c.m. 3-ton, 2 Q.F., 18 M.	5 f. tu. or 1. car.	1879	..	15·17	950	2800
a.c.b.	Duguesclin (steel, sheathed with copper)	5894	266 0	57 0	25 3	2	3300	9	8 compound	15 2"	4 24-c.m. 16-ton, 1 19-c.m. 8-ton, 6 14-c.m. 3-ton, 1 9·0-m.m. Q.F., 10 M.	2 l.car.	1883	220,000	14·0	400	..
a.c.	Dupuy de Lôme	6297	374 0	51 6	23 6	3	14,000	4	4	.. 2"	2 19-c.m. 11-ton, 6 16-c.m. Q.F., 65-m.m. & 47-m.m. do., 8 M.	4 f. tu. or l.car	1890	416,000	20·0	900	4000
a.g.b.	Flamme . (special metal)	1046	165 0	32 7	10 4	2	1500	10	4-in. shield	.. 2"	1 24-c.m. 16-ton, 1 9-c.m., 4 M.	1 f. tu.	1885	68,000	13·0	120	..
b.	Formidable (steel)	11,441	321 6	69 6	26 2	2	9700	21½	17¾	14 3"	3 37-c.m. 75 ton, 4 16-c.m., 8 14-c.m. Q.F., 9 47-m.m. do., 14 M.	4 f. tu.	1885	467,520 hull, 85,800 machinery.	16·2	1200	..
c.b. & b.	Friedland . (iron)	8824	317 0	58 0	29 11	1	4428	8	7	15	8 27-c.m. 23-ton, 8 14-c.m. 3-ton, 20 M.	4 f. tu. or l.car	1873	..	13·3	630	..

(A) Tonnages given in French lists are either from Durassier or M. Weyl.

(d) Ships marked thus are, it is stated, unfit for service without repair.

FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length at Water Line.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Battery or Turret.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		A tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
c.d.s., t.	**Fulminant** (iron and steel)	5651	248 0	57 9	21 4	1	4500	13	12	16 2″	2 27-c.m. 23-ton, 4 47-m.m. Q.F., 6 M.	2 l.car.	1877	..	13·8	400	..
c.d.s., b.	**Furieux** (iron & steel)	6000	247 10	59 0	21 9	2	5033	20	17¾	.. 3½″	2 34-c.m. 48-ton, 5 Q.F., 10 M.	2 l.car.	1883	264,640	14·0	290	1500
a.g.b.	**Fusée** . (steel, copper sheathed)	1150	165 0	32 7	10 4	2	1500	10	4-in. shield	.. 2″	1 24-c.m. 16-ton, 1 9-c.m., 4 M.	1 f. tu.	1884	68,000	13·0	120	..
,,	**Grenade** (steel, copper sheathed)	1046	165 0	32 7	10 4	2	1500	10	4-in. shield	.. 2″	1 27-c.m. 16-ton, 1 9-c.m., 4 M.	..	1888	68,000	13·0	120	..
	Henri IV. . .	(?) 11,232	Design	not	settled		14,000	..	..	..	4 30-c.m., 10 14-c.m. Q.F., 6 10-c.m. do., 36 47-m.m. & 37-m.m. do.	..	Pro.	..	18·0	..	..
t. & b.	**Hoche** (iron & steel)	10,650	333 0	65 7	27 3	2	11,300	18	16	.. 3″	2 34-c.m. 52-ton, 2 27-c.m. 28-ton, 18 14-c.m. 3-ton, 8 Q.F., 12 M.	4 f. tu. or 1. car.	1886	700,000	16·0	800	4000
b.	**Indomptable** (iron and steel)	7168	279 10	59 0	23 6	2	6605	20	17½	.. 3″	2 42-c.m. 75-ton, 4 10-c.m. Q.F., 2 47-m.m. do., 16 M.	..	1883	..	14·8	400	..
t.	**Jauréguiberry** . (steel)	11,824	356 0	72 8	27 9	2	14,200	17¾	14½ 4-in. on upper works	.. 2¾″	2 30-c.m., 2 27-c.m., 8 14-c.m. Q.F., 4 65-m.m. do., 12 47-m.m. do., 8 37-m.m. M.	6 f. tu. or l.car	1893	980,284	17·5	800	..
c.d.s., t.	**Jemmapes** . .	6590	284 0	57 8	22 0	2	8400	17¾10″	17¾	.. 4″–2¾″	2 34-c.m. 48-ton, 4 10-c.m. (Canet) Q.F., 10 37-m.m. do.	4 f. tu. or l. car	1892	525,000	16·5	300	..
a.c.b.	**La Galissonnière** (wood)	4700	255 8	49 0	23 9	2	2370	6	4¾	26	6 24-c.m. 16-ton, 6 14-c.m. 3-ton, 8 M.	..	1872	..	13·08	450	..
a.c., t.	**Latouche Tréville** (steel)	4745	348 0	46 0	19 2	2	8300	3⅝	3⅝ conning tower.	.. 2″–1½″	2 19-c.m., 6 14-c.m. Q.F., 4 65-m.m. do., 6 47-m.m. do., 6 37-m.m., M.	5 f. tu. or l.car	1892	360,000	19·0	406	..
t.	**Lazare Carnot** (steel)	12,008	380 0	70 6	26 0	2	15,000	17¾	14½ 4-in on upper works	.. 2¾″	2 30-c.m., 2 27-c.m. 8 14-c.m. Q.F., 4 65-m.m. do., 12 47-m.m. do., 8 37-m.m., M.	6 f. tu. or l.car	Bldg. at Toulon	994,240	17·5	800	..
b.	**Magenta** (iron and steel)	10,600	330 0	65 7	27 3	2	12,000	18	16	.. 3″	4 34-c.m. 52-ton, 17 14-c.m. do., 4 65-m.m. Q.F., 12 47-m.m. do., 8 M.	4 f. tu. or 1. car.	1890	760,960 including armament	16·25	800	4000
b.	**Marceau** (iron & steel)	10,581	330 0	65 7	27 3	2	12,000	18	16	.. 3″	4 34-c.m. 52-ton 17 14-c.m. Q.F., 4 65-m.m. and 12 47-m.m. do., 8 M.	4 f. tu. or l.car	1887	769,080 including armament.	16·4	800	4000
c.b. & b.	**Marengo** . (wood)	7748	282 6	56 10	27 8	1	3673	8	6¼	32	4 27-c.m. 27-ton, 4 24-c.m. 16-ton, 7 14-c.m., 12 M.	..	1869	280,000	13·49	700	..
t.	**Masséna** (steel)	11,900	368 6	66 6	26 3	3	12,600	17¾–9¾ Schneidr steel	15¾–15⅝ 4-in. small tur.	.. 3½″	2 30-c.m., 2 27-c.m., 8 14-c.m. Q.F., 8 10-c.m. Q.F., 12 47-m.m. and 18 37-m.m. do., or M.	5 f. tu. or l.car	Bldg. at St. Na-zaire.	980,284	17·5	635	4000
a.g.b.	**Mitraille** (steel, sheathed with copper)	1130	165 0	32 7	10 4	2	1500	10	4-in. shield	.. 2″	1 27-c.m. 16-ton, 1 9-c.m., 4 M.	1 f. tu.	1886	70,000	13·0	120	..
b.	**Neptune** (iron & steel)	10,630	330 0	65 7	27 3	2	11,045	18	16	.. 3″	4 34-c.m. 52-ton, 17 14-c.m. Q.F., 4 65-m.m. and 12 47-m.m. do., 8 M.	4 f. tu. or 1. car.	1887	780,000 including armament	16·02	800	4000
c.b. & b.	**Océan** . (wood)	7750	282 6	56 10	27 3	2	3781	8	6¼	32	4 27-c.m., 4 24-c.m., 8 14-c.m. 3-ton, 3 Q.F., 12 M.	..	1868	..	13·7	650	..
a.g.b.	**Phlégéton** . (steel)	1790	187 0	40 4	11 10	2	1700	9	8	.. 2″	1 27-c.m. 28-ton, 1 14-c.m. Q.F., 4 47-m.m. do., 4 M.	..	1890	142,000	12·4	72	..
a.c.t.	**Pothuau** . (steel)	5320	370 6 (overall)	50 2	21 4	..	10,000	3⅛–2	7-inch 9½ C. T.	.. 3⅛″–1⅞″	2 19-c.m., 10 14-c.m. Q.F., 16 47-m.m. do., 8 37-m.m. do.	5 f. tu. or 1. car.	Bldg.	384,000	20·0	538	..
c.b. & b.	**Redoutable** (iron & steel)	8860	318 2	64 8	25 6	2	6071	14	9½	15 2½″	8 27-c.m. 24-ton, 6 14-c.m. 3-ton, 2 Q.F., 12 M.	..	1876	..	14·66	1000	2800
b.	**Requin** . (iron & steel)	7200	279 10	59 0	24 7	2	6000	19½	17¾	.. 3″	2 42-c.m. 75-ton, 4 10-c.m. Q.F., 2 47-m.m. do., 16 M.	..	1885	..	15·0	400	..
c.b. & b.	**Richelieu** . (wood)	8767	323 6	57 10	27 11	2	4006	8½	6¼	..	6 27-c.m. 23-ton, 5 24-c.m. 16-ton, 8 14-c.m., 18 M.	4 f. tu. or l.car.	1873	..	13·11	640	..
t.	**Saint Louis** (steel)	11,232	385 6	66 7	25 10	3	14,000	15¾	3″–15¾	3½″–1½″	4 30-c.m., 10 14-c.m. Q.F., 6 10-c.m. do., 3 47-m.m. & 37-m.m. do.	6 f. tu. or 1. car.	Bldg.	960,000	18·0	..	..
a.g.b.	**Styx** . (steel)	1790	187 0	40 4	11 10	2	1700	9	8	.. 2	1 27-c.m. 27-ton, 1 14-c.m. Q.F., 4 47-m.m. do., 4 M.	..	1892	142,000	13·0	72	..
c.b. & b.	**Suffren** . (wood)	7782	282 6	57 10	29 10	1	4288	8	6¼	32	4 27-c.m., 4 24-c.m., 6 14-c.m. 3-ton, 12 M.	4 f. tu. or 1. car.	1870	..	14·3	700	..

(A) Tonnages given in this list are either from Durassier or M. Weyl. (*d*) Ships marked thus are, it is stated, unfit for service without repair.

FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length at Water Line.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Battery or Turret.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		A tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
c.d.s., t.	Tempête (iron & steel)	4869	248 0	57 9	16 9	1	2193	13	12	15¾ 2″	2 27-c.m. 28-ton, 4 47-m.m. Q.F., 6 M.	2 l. car.	1876	..	11·7	200	..
b.	Terrible (iron & steel)	7713	279 10	59 0	24 7	2	6230	19½	17¾	.. 3″	2 42-c.m. 75-ton, 4 10-c.m. Q.F., 2 47-m.m. do., 16 M.	..	1881	..	14·5	400	..
c.b.	Thétis (*d*) . (wood)	3624	230 3	46 2	20 10	1	1859	6	4¾	26	6 19-c.m. 8-ton, 4 14-c.m., 4 M.	..	1867	..	12·0	300	..
c.d.s., b.	Tonnant (iron & steel)	5100	248 7	58 5	17 3	1	1935	18	14½	15¾ 3″	2 34-c.m. 48-ton, 4 M. . .	..	1880	..	11 5	200	..
c.d.s., t.	Tonnerre (iron & steel)	5589	248 0	57 9	21 4	1	4165	13	12	15¾ 2″	2 27-c.m. 28-ton, 4 47-m.m. Q.F., 6 M.	2 l. car.	1875	..	14·01	400	..
t.	Tréhouart . (steel)	6610	284 0	58 6	22 0	2	8400	17¾–10″	14½ Base of turret, 12¼	.. 4″–2¾″	2 30-c.m., 8 10-c.m. (Canet) Q.F., 10 37-m.m. do.	4 f. tu. or l. car	1893	506,960	17·0	300	..
c.b. & b.	Trident . (wood)	8456	317 9	56 4	29 1	1	4652	8½	6¼	34	8 27-c.m. 23-ton, 2 24-c.m. 16-ton, 6 14-c.m. 2 Q.F., 14 M.	2 f. tu. or 1. car.	1876	..	14·17	650	..
”	Triomphante (wood)	4700	258 2	48 9	22 5	1	2400	..	4¾	26	6 24-c.m. 16-ton, 1 19-c.m. 8-ton, 6 14-c.m., 8 M.	..	1877	..	12·89	410	..
a.c.	Turenne . (wood)	6400	265 9	57 2	23 11	2	4160	10	8	15 2″	4 24-c.m. 16-ton, 2 19-c.m. 8-ton, 6 14-c.m. 3-ton, 12 M.	..	1879	..	14·14	500	..
c.d.s., t.	Valmy . . .	6590	284 0	57 8	22 0	2	8400	17¾–10	17¾	.. 4″–2¾″	2 34-c.m. 48-ton, 4 10-c.m. (Canet) Q.F., 10 37-m.m. do.	2 f. tu. or l. car	1892	525,000	17·0	..	..
a.c.	Vauban . (steel)	6150	267 9	57 3	24 0	2	4560	10	8	15 2″	4 24-c.m. 16-ton, 1 19-c.m., 6 14-c.m., 12 M.	2 l. car.	1882	..	14·32	550	..
c.d.s., t.	Vengeur (iron & steel)	4700	248 0	57 9	16 9	2	2030	13	12	15¾ 2″	2 34-c.m. 48-ton, 4 47-m.m. Q.F., 6 M.	2 l. car.	1878	..	10·83	200	..
c.b. & b.	Victorieuse (wood)	4700	258 2	48 9	22 5	1	2214	6	4¾	26	6 24-c.m. 16-ton, 1 19-c.m. 8-ton, 6 14-c.m., 8 M.	..	1875	..	12·75	400	..

(A) Tonnages given in this list are either from Durassier or M. Weyl.

(*d*) Ships marked thus are, it is stated, unfit for service without repair.

FRANCE.—Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Dischargers for Torpedoes.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		A tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
cr. 2ndclass	Alger . . . P. 3½"	4122	346 0	45 3	19 6	2	8254	steel	4 16-c.m. Q.F., 6 14-c.m. do., 10 other Q.F., 10 M.	4 f. tu. or l.car	1889	280,000	19·61	860	..
cr. 2ndclass	Aréthuse	3649	277 6	43 6	21 9	1	4200	wood	4 16-c.m. 5-ton, 22 14-c.m. 3-ton, 8 M.	..	1882	..	14·0	500	..
g.v.	Aspic	480	145 4	23 10	10 6	1	453	composite	2 14-c.m. 3-ton, 2 10-cm. . .	..	1880	..	10·3	50	..
cr. 3rd class	Beautemps-Beaupré . .	1246	204 8	34 2	15 10	1	985	wood	6 14-c.m. 3-ton, 8 M.	..	1872	..	12·6	250	..
d.v.	Bisson	827	199 5	28 5	12 8	1	849	wood	3 14-c.m. 3-ton, 1 10-c.m. 5 M. .	..	1874	..	11·78	200	..
to.g.b.	Bombe	395	196 10	21 7	5 11	2	1800	steel	4 47-m.m. Q.F., 3 M. . . .	2 f. tu. or l.car	1885	..	18·0	100	..
cr. 2ndclass	Bugeaud . . . P. 4"-2¾"	3722	308 6	43 6	20 10	2	9000	steel	6 16-c.m. Q.F., 4 10-c.m. do., 8 47-m.m. do., 12 37-m.m. M.	6 f. tu. or l.car	1893	260,330	19·25	587	..
g.v.	Capricorne.	480	148 4	23 10	10 5	1	443	wood	2 14-c.m. 3-ton, 2 10-c.m. . .	..	1882	..	11·18	70	..
to.g.b.	Casabianca	945	262 6	27 4	10 3	2	5000	steel	1 10-c.m. Q.F., 3 65-m.m. do., 5 47-m.m., 4 37-m.m.	3 f. tu. or l.car	Bldg.	..	21·5	..	..
cr. 2ndclass	Cassard (ex P.) . . P. 3¼"-1½"	3972	325 6	44 11	19 0	2	9600	steel	6 16-c.m. Q.F., 4 10-c.m. do., 12 47-m.m., 16 37-m.m.	6 f. tu. or l.	Bldg.	272,000	19·2	..	..
to.g.b.	Cassini	945	262 6	27 4	11 6	2	5000	steel	1 10-c.m. Q.F., 3 65-m.m. do., 4 37-m.m. do.	6 f. tu.	Bldg.	98,500	21·5	110	..
cr. 2 class	Catinat (ex G 4) . . P. 1¾"-1¼"	3998	328 9	41 4	19 8	2	9000	steel	4 16-c.m. Q.F., 10 10-c.m. do., 14 47-m.m., 9 37-m.m. M.	6 f. tu. or l.car	Bldg.	..	19·0	..	..
cr. 1st class	Cécille . . . . P. 2"	5766	378 9	49 3	19 9	2	9600	cop. sheathed iron and steel	8 16-c.m. 5 ton, 10 14-c.m. 3-ton 6 47-m.m. Q.F., 14 M.	4 f. tu. or l.car	1888	299,666	19·0	940	..
cr. 2ndclass	Chasseloup-Laubat . P. 4"-2¾"	3722	308 6	43 6	20 10	2	9000	steel	6 16-c.m. Q.F., 4 10-c.m. do., 8 47-m.m. do., 12 37-m.m. M.	6 f. tu. or l.car	1893	256,320	19·25	587	..
d.v.	Chasseur	830	199 5	28 5	12 7	1	850	wood & iron	4 14-c.m., 1 65-m.m., 4 M. . .	..	1878	..	11·06	170	..
cr. 3rd class	Coetlogon . . . P. 1½"	1848	312 0	30 5	14 0	2	5800	steel	4 14-c.m. Q.F., 3 other Q.F., 4 M. .	5 f. tu. or l.car	1889	134,000	19·3	200	2400
g.v.	Comète	473	151 6	24 9	10 6	1	450	composite	2 14-c.m., 2 10-c.m., 2 M. . .	..	1884	..	12.2	60	..
to. cr.	Condor . . . . P. 1½"	1240	216 6	29 3	15 5	2	3800	steel	5 10-c.m. Q.F., 1 65-m.m. do., 6 M.	5 f. tu. or l.car	1885	80,000	17·7	160	..

(A) Tonnages given in this list are either from Durassier or M. Weyl.

FRANCE.—Unarmoured Ships—*continued*.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Dischargers for Fish Torpedoes.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		(A) tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
cr. 3rd class	Cosmao . . . P. 1½"	1877	312 0	30 5	14 0	2	6000	steel	4 14-c.m. Q.F., 3 other Q.F., 4 M.	5 f. tu. or 1.car	1888	133,000	20 5	200	2400
to.g.b.	Couleuvrine	395	196 10	21 7	5 11	2	1800	steel	4 47-m.m. Q.F., 3 M.	2 f. tu. or 1.car	1885	..	18·0	100	..
g.v.	Crocodile	466	141 10	24 0	9 5	1	441	composite	1 14-c.m. 2 90-m.m.	..	1874	..	9·68	60	..
to.g.b.	Dague	395	196 10	21 7	5 11	2	1800	steel	4 47-m.m. Q.F., 3 M.	2 f. tu. or 1.car	1885	..	18·0	100	..
cr. 2ndclass	D'Assas . . . P. 3¼"-1¼"	3992	325 6	44 11	19 0	2	9600	steel	6 16-c.m. Q.F., 4 10-c.m. do., 12 47-m.m., 16 37-m.m. rev.	..	Bldg.	..	19·0	..	..
cr. 2ndclass	Davout . . . P. 2⅜"	3027	297 6	40 0	17 6	2	8881	steel	6 16-c.m. Q.F., 4 10-c.m. do., 4 65-m.m. do., 4 47-m.m. do., 6 M.	4 f. tu. or 1.car	1890	..	20·07	600	400 12½ kts.
cr. 1st class	D'Entrecasteaux . P. 4"-¾"	8114	384 0	58 6	23 6	2	14,000	steel 10 shields	2 24-c.m., 12 14-c.m. Q.F., 12 47-m.m. do., 4 37-m.m. do.	7 f. tu. or 1.car (2 sub)	Bldg.	620,000	19·0	1000	..
cr. 3rd class	Desaix	1700	259 2	34 8	17 7	1	1442	wood	4 10-c.m., 1 65-m.m., 4 M.	..	1866	..	14·21	300	..
cr. 2ndclass	Descartes . . . P. 1⅜"	3980	315 6	42 4	19 9	2	9000	steel	4 16-c.m. Q.F., 10 10-c.m. do., 14 47-m.m. do., 8 37 m.m. M.	4 f. tu. or 1 car	Bldg.	258,800	19·0	800	..
cr. 3rd class	D'Estaing	2236	262 5	37 5	18 8	1	3700	wood & iron	15 14-c.m. 3-ton, 8 M.	..	1879	..	15·31	300	..
to.g.b.	D'Iberville	925	262 6	27 0	11 2	2	5000	steel	1 10-c.m., 1 65-m.m., 4 37-m.m. Q.F.	6 f. tu.	1893	99,120	21·5	117	..
to.g.b.	Dragonne	395	196 10	21 7	5 11	2	1800	steel	4 47-m.m., Q.F., 3 M.	2 f. tu. or 1.car	1885	..	18·0	100	..
cr. 2ndclass	Dubourdieu	3566	253 7	46 6	22 10	1	3300	wood	4 16-c.m. 5-ton, 12 14-c.m., 10 M.	1 f. tu. or 1.car	1884	154,553	14·0	600	..
cr. 3rd class	Duchaffault	1289	204 8	34 2	16 0	1	1214	wood	6 14-c.m. 3-ton, 6 M.	..	1872	..	12·72	250	..
cr. 2ndclass	Duchayla . . . P. 3¼"-1¼"	3992	325 6	44 11	19 0	2	9600	steel & copper sheathed	6 16-c.m. Q.F., 4 10-c.m. do., 12 47-m.m. do., 16 37-m.m. rev.	..	Bldg.	272,000	19·0	..	..
cr. 2ndclass	Duguay Trouin . . .	3661	296 3	43 4	20 6	1	3740	iron & wood	5 16-c.m. 5 14-c.m. 3-ton., 4 47-m.m. Q.F., 5 M.	2 f. tu. or 1.car	1877	..	15·9	700	..
g.v.	Dumont d'Urville . .	825	201 11	28 6	13 8	1	850	wood	4 14 c.m. 3-ton 1 10-c.m., 1 65-m.m., 2 M	..	1878	..	11·6	200	..
cr. 3rd class	Dupetit Thouars . .	1931	257 10	35 9	16 0	1	2018	wood	10 14-c.m. 3-ton, 8 M. .	..	1874	..	15·07	300	..
cr. 2ndclass	Duquesne	5824	333 5	50 3	25	1	6589	iron & wood	7 16-c.m., 14 14-c.m., 8 M.	..	1876	..	16·9	900	..
cr. 2ndclass	E (4) (5) (6)	..	..	..	..	..	..	..	..	..	Pro.	..	19·0	..	..
cr. 3rdclass	Éclaireur	1658	236 3	35 5	17 0	1	2050	iron & wood	8 14-c.m. 3-ton, 6 M.	..	1877	..	15·0	200	..
to.cr.	Epervier . . . P. 1½"	1240	216 6	29 3	15 5	2	3200	steel	5 10-c.m. Q.F., 1 65-m.m. do., 6 M.	5 f. tu. or 1.car	1885	80,000	17·6	160	..
g.v.	Étoile	502	149 3	24 7	8 4	2	450	composite	6 10-c.m., 1 65-m.m., 2 M.	..	1885	..	10·0	60	..
cr. 3rd class	Fabert	1927	294 4	36 0	18 4	1	1107	wood	8 14-c.m. 5-ton, 4 M.	..	1874	..	12·42	300	..
to.cr.	Faucon . . . P. 1½"	1240	216 6	29 3	15 5	2	3200	steel	5 10-c.m. Q.F., 1 65-c.m. do., 6 M.	5 f. tu. or 1.car	1887	80,000	17·1	150	..
to.g.b.	Flèche	395	196 10	21 7	5 11	2	1800	,,	4 47-m.m. Q.F., 3 M.	2 f. tu. or 1.car	1885	..	18·0	100	..
cr. 3rd class	Fleurus	1310	223 2	29 3	14 0	2	4000	,,	5 10-c.m. Q.F., 2 65-m.m. do.	4 f. tu. or 1. car	1893	116,300	18·0	116	2000
cr. 3rd class	Forbin . . . P. 1½"	1848	312 0	30 5	16 0	2	6000	,,	4 14-c.m. Q.F., 3 other Q.F., 4 M.	5 f. tu. or 1.car	1888	..	20·6	200	2000
cr. 3rd class	Forfait	2321	249 4	38 0	18 0	1	2764	wood & iron	15 14-c.m. 3-ton, 8 M.	..	1879	..	13·44	400	..
cr.	Foudre (torpedo depôt ship) P. 1½"	5970	370 6	51 3	20 2	2	11,400	steel	8 10-c.m. Q.F., 4 6½-c.m. do., 4 47-m.m. do.	5 f. tu.	Bldg.	399,000	19·0	845	..
cr. 2ndclass	Friant . . . P. 4"-2⅜"	3722	308 6	43 6	20 10	2	9,000	,,	6 16-c.m. Q.F., 4 10-c.m. do., 8 47-m.m. do., 12 37-m.m. M.	6 f. tu. or 1. car	1893	258,500	19·25	587	..
g.v.	Fulton	811	199 5	28 5	12 8	1	850	wood	2 14-c.m. 3-ton, 1 10-c.m., 5 M.	..	1887	37,000	13·0	160	..
cr. 2ndclass	G (3)	3740	..	..	..	..	..	..	..	..	Pro.	..	19·2	..	..
g.v.	Gabes	490	151 6	24 9	10 6	1	450	comp.	2 14-c.m., 2 10-c.m. 2 M.	..	1884	..	11·0	60	..
cr. 3rd class	Galilée . . . P. 1½"	2317	321 6	35 1	14 7	2	6500	steel	4 14-c.m. Q.F., 2 10-c.m. do., 8 47-m.m. do., 4 37-m.m. do., 4 M.	4 f. tu. or 1.car	Bldg.	171,520	20·0	..	..
cr. 3rd class	Hirondelle	1200	249 6	30 4	12 8	2	1780	wood	2 10-c.m., 8 M.	..	1869	..	15·5	150	..
cr. 3rd class	Hugon	1246	204 5	34 2	15 10	1	1054	,,	6 14-c.m. 3-ton, 5 M.	..	1872	..	11·72	250	..
g.v.	Hussard	825	201 10	28 6	13 7	1	850	,,	4 14-c.m.. 2 M.	..	1877	..	12·08	200	..
d.v.	Inconstant	811	199 5	28 5	12 7	1	850	wood	2 14-c.m., 1 10-c.m., 5 M.	..	1886	37,000	13·0	160	..
c.r. 2ndclass	Iphigénie (Training ship) .	3346	244 6	46 6	22 4	1	2800	wood	2 16-c.m. 5-ton, 18 14-c.m. 3-ton, 10 M., 3 l.	..	1881	..	14·6 (b)	..	..
cr. 2ndclass	Isly . . . . P. 3½"	4160	346 0	43 6	19 6	2	8100	steel	4 16-c.m. Q.F., 6 14-c.m. do., 6 47-m.m. do., 6 M.	4 f. tu. or 1.car	1891	252,760	18·1	880	..

(A) Tonnages given in this list are either from Durassier or M. Weyl.

(b) Trial stated to have been made in bad weather.

FRANCE.—Unarmoured Ships—*continued.*

Class.	NAME.		Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
			A tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
cr. 2ndclass	Jean Bart	P. 3½"	4160	346 0	43 6	19 6	2	8000	steel	4 16-c.m. Q.F., 6 14-c.m. do., 6 47-m.m. do., 6 M.	4 f. tu. or l.car	1889	283,240	19·0	..	..
cr. 1st class	Jeanne d'Arc	P.	9000	..	..	..	..	..	..	.. .. ..	..	Pro.	..	19·0	..	..
cr. 3rd class	Kerguelen		1235	204 5	34 2	15 10	1	1200	wood	6 14-c.m. 3-ton, 5 M.	..	1872	..	12·76	230	..
cr. 3rd class	Laclocheterie		1943	262 2	35 9	18 4	1	1918	"	10 14-c.m. 3-ton, 1 65-m.m., 6 M.	..	1872	..	13·73	350	..
cr. 3rd class	Lalande	P. 1½"	1877	311 6	31 2	14 0	2	6000	steel	4 14-c.m. Q.F., 3 other Q.F., 4 M.	5 f. tu. or l.car	1888	133,800	22·0	200	2400
to.g.b.	Lance		395	196 10	21 7	5 11	2	1800	"	4 47-m.m. Q.F., 3 M.	2 f. tu. or l.car	1886	..	18·0	100	..
cr. 3rd class	Lapérouse		2319	262 5	37 5	18 8	1	2280	wood & iron	15 14-c.m. 3-ton, 8 M.	..	1877	..	14·73	300	..
cr 3rd class	Lavoisier	P.	2300	..	..	..	..	6600	..	4 14-c.m. Q.F., 2 10-c.m. do., 8 47-m.m. do., 8 37-m.m. do., 4 M.	4 f. tu. or l.car	Bldg.	..	20·0	..	..
to.g.b.	Léger		450	197 0	23 0	10 6	2	2345	steel	1 10-c.m. Q.F., 3 65-m.m. do., 4 37-m.m. do.	4 f. tu. or l.car	1891	52,000	18·8	130	..
to.g.b.	Lévrier		450	197 0	23 0	10 6	2	2345	"	1 10-c.m. Q.F., 3 65-m.m. do., 4 37-m.m. do.	..	1891	52,000	18·5	130	..
cr. 3rd class	Linois	P. 1½"	2270	321 6	34 6	17 5	2	6600	steel	4 14-c.m. Q.F., 2 10-c.m. do., 8 47-m.m. do., 4 37-m.m. do., 4 M.	4 f. tu. or l.car	1894	163,014	20·0	190	..
g.v.	Lion		473	151 6	24 9	10 6	1	576	composite	2 14-c.m. 3 ton, 4 M.	..	1884	..	11·8	70	..
g.v.	Lutin		474	141 9	23 11	9 4	1	373	"	2 14-c.m., 2 10-c.m.	..	1877	..	10·00	60	..
"	Lynx		474	141 9	23 11	9 4	1	427	"	2 14-c.m., 2 10-c.m.	..	1878	..	10·38	60	..
cr. 3rd class	Magon		2294	249 4	38 0	18 0	1	2462	wood & iron	15 14-c.m. 3-ton, 8 M.	..	1881	..	14·17	350	..
g.v.	Météore		473	151 6	24 9	10 6	1	450	composite	2 14-c.m., 3 M.	..	1884	..	10·00	70	..
cr. 3rd class	Milan		1550	303 2	32 10	14 7	2	4132	steel	5 10-c.m. Q.F., 8 M.	2 f. tu. or l.car	1886	..	18·10	400	..
cr. 2ndclass	Naiade		3525	246 0	47 2	22 10	1	3260	iron sheathed with copper.	2 16-c.m. 5-ton, 18 14-c.m., 10 M.	4 f. tu. or l.car	1881	..	13·68	500	..
cr. 3rd class	Nielly		2257	262 5	37 5	18 8	1	2921	wood & iron	15 14-c.m. 3-ton, 8 M.	..	1880	..	15·23	300	..
g.v.	Papin		811	199 6	28 6	13 7	1	850	wood & iron	2 14-c.m., 1 10-c.m., 5 M.	..	1886	37,000	13·00	160	..
g.v.	Parseval		860	197 6	28 0	12 2	1	817	wood & iron	4 14-c.m., 4 M.	..	1879	..	12·33	150	..
cr. 2ndclass	Pascal	P. 1¾"	3988	315 6	42 4	19 9	2	9000	steel	4 16-c.m. Q.F., 10 10-c.m. do., 14 47-m.m. do., 8 37-m.m. M. do.	4 f. tu. or l.car	Bldg.	268,120	19·25	587	..
cr. 3rd class	Primauguet		2270	262 5	37 5	18 8	1	2268	wood & iron	15 14-c.m. 3-ton, 8 M.	..	1882	..	14·50	300	..
cr. 3rd class	Rigault de Genouilly		1713	236 3	35 5	17 0	1	2050	wood and iron topsides	8 14-c.m. 3-ton, 8 M.	..	1876	..	14·49	200	..
cr. 3rd class	Roland		2819	249 4	38 0	17 7	1	2700	"	15 14-c.m. 3-ton, 8 M.	..	1882	..	14·50	350	..
g.v.	Sagittaire		450	148 4	23 10	10 5	1	427	wood & iron	2 14-c.m., 2 10-c.m.	..	1881	..	11·05	70	..
to.g.b.	Sainte Barbe		395	196 10	21 7	5 11	2	1800	steel	4 47-m.m. Q.F., 3 M.	2 f. tu. or l.car	1885	..	18·0	100	..
"	Salve		395	196 10	21 7	5 11	2	1800	"	4 47-m.m. Q.F., 3 M.	2 f. tu. or l.car	1886	..	18·0	100	..
g.v.	Scorpion		473	151 6	24 9	10 6	1	450	composite	2 14-c.m. 3-ton, 3 M.	..	1883	..	11·0	70	..
cr. 3rd class	Segond		1264	204 8	34 2	15 10	1	894	wood	6 14-c.m. 3-ton, 4 M.	..	1869	..	11·26	250	..
cr. 2ndclass	Sfax	P. 1½"	4502	288 9	49 3	24 9	2	6034	steel & wood	6 16-c.m. 5-ton, 10 14-c.m. 3-ton, 3 Q.F., 7 M.	5 f. tu. or l.car	1884	200,000	16·84	1000	..
cr. 2ndclass	Suchet	P. 2⅜"	3430	318 3	43 6	17 6	2	9000	steel	4 16-c.m. Q.F., 4 10-c.m. do., 4 47-m.m. do., 8 37-m.m. do., 6 M.	4 f. tu. or l.car	1893	226,360	20·0	480	4000 at 12½ kts.
cr. 3rd class	Surcouf	P. 1½"	1848	312 0	30 5	14 0	2	6000	"	4 14-c.m. Q.F., 3 other Q.F., 4 M.	5 f. tu. or l.car	1888	131,200	20·5	200	2400
g.v.	Surprise		626	183 9	24 7	12 3	2	650	steel & cop. sheathed	2 10-c.m. Q.F., 4 65-m.m. do., 4 47-m.m. do.	..	Bldg.	44,000	13·0	73	..
cr. 1st class	Tage	P. 2"	7345	390 0	53 8	22 10	2	10,330	steel	8 16-c.m. 5-ton, 10 14-c.m. 3-ton, 6 Q.F., 14 M.	7 f. tu. or l.car	1886	..	19·0	1000	..
cr. 2ndclass	Tourville		5743	333 5	50 3	25 4	1	·7466	iron & wood	7 16-c.m. 5-ton, 14 14-c.m. 3-ton, 8 M.	..	1876	..	16·89	800	..
cr. 3rd class	Troude	P. 1½"	1877	311 6	31 2	14 0	2	6000	steel	4 14-c.m. Q.F., 3 other do., 4 M.	5 f. tu. or l.car	1888	..	20·9	200	2400
g.v.	U (1)		..	..	..	..	..	..	..	. . . .	..	..	..	..	..	..
cr. 3rd class	Vautour	P. 1½"	1280	216 6	29 3	15 5	2	3200	steel	5 10-c.m. Q.F., 1 65-m.m. do., 6 M.	5 f. tu. or l.car	1886	80,000	17·3	150	..
cr. 3rd class	Villars		2419	249 4	38 0	17 7	1	2380	wood & iron	15 14-c.m. 3-ton, 8 M.	..	1879	..	14·25	350	..
g.v.	Vipère		463	145 4	23 10	10 6	1	427	composite	2 14-c.m., 2 10-c.m.	..	1881	..	10·3	60	..
g.v.	Voltigeur		851	199 5	28 5	12 7	1	850	wood & iron	4 14-c.m., 4 M.	..	1878	..	12·48	150	..
cr. 3rd class	Wattignies		1310	230 0	29 3	15 0	2	4189	steel	5 10-c.m. Q.F., 2 65-m.m. do., 4 37-m.m. M.	4 f. tu. or l.car	1891	111,000	18·61	16·0	1800 at 12½ kts.

(A) Tonnages given in this list are either from Durassier or M. Weyl.

Four river and local (screw) despatch vessels (Avisos de flotille), of 200 to 300 tons; 100 to 700 I.H.P.; *eighteen river (paddle) despatch vessels. Sixteen (screw) and eighteen (paddle) river gunboats (Chaloupes canonnières).*

GERMANY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour: Belt or Citadel	Armour: Turret, Barbette or Breastwork.	Backing. Deck Plating.	Armament: Guns.	Armament: Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	ins.				£	knots.	tons.	knots.
b. 2nd class	Baden . . (iron)	7400	298 0	60 0	19 8	2	5600	16	10 on barbette	8	6 26-c.m. 18-ton Krupp, 4 10½-c.m. Q.F., 6 M., 2 l.	4 f. tu. or l. car	1880	444,886	14·0	700	..
a.g.b.	Basilisk . (iron)	1109	143 0	35 6	10 2	2	700	8	8 turret	8 2′	1 30½-c.m. 35-ton, 2 M. . .	1 f. tu.	1878	58,042	9·0	40	..
b. 2nd class	Bayern . (iron)	7400	298 0	60 0	19 8	2	5600	16	10 barbette	8 2″	6 26-c.m. 18-ton Krupp, 4 10½-c.m. Q.F., 6 M., 2 l.	4 f. tu. or l. car	1878	406,660	14·0	700	..
c.d.s.b.	Beowulf . (steel)	3500	240 0	49 3	17 9	2	4800	9½	8 barbette	.. 2″	3 24-c.m. 19-ton, 6 8·7-c.m. Q.F.	4 f. tu. or l. car	1890	175,000	15·0	..	..
a.g.b.	Biene . . (iron)	1109	143 0	35 6	10 2	2	700	8	8 turret	8 2″	1 30½-c.m. 35-ton, 2 M. . .	1 f. tu.	1876	62,853	10·0	40	..
b. 1st class	Brandenburg .	9842	354 4	64 0	24 7	2	9640	15¾ to 11¾ comp.	11¾ barbette comp.	8 2½″	6 28-c.m., 6 10½-c.m. Q.F., 8 8·7-c.m. do. & M.	7 f. tu. or l. car	1891	..	16·5	..	..
a.g.b.	Camäleon . (iron)	1109	143 0	35 6	10 2	2	700	8	8 turret	8 2″	1 30½-c.m. 35-ton, 2 M. . .	1 f. tu.	1878	57,564	10·0	40	..
„	Crocodil . (iron)	1109	143 0	35 6	10 2	2	700	8	8 turret	8 2″	1 30½-c.m. 35-ton, 2 M. . .	1 f. tu.	1879	57,237	10·0	40	..
c.b. 2nd class	Deutschland (iron)	7676	280 0	62 4	24 7	1	8000	10	8	10 2″	8 26-c.m. 22-ton, 1 21-c.m. 13-ton, 7 15-c.m. 4-ton, 6 M., 4 l.	5 f. tu. or l. car	1874	412,022	14·5	710	3400
1st class	New ships (*a*) (steel)	..	..	..	..	..	..	..	..	..	.. .. ..	..	Pro.	..	..	..	..
t. 3rd class	Friedrich der Grosse (iron)	6770	307 0	53 6	24 7	1	4930	9¼	8 breastwork, 10 turret	8¼	4 26-c.m. 18-ton Krupp, 2 17-c.m. 6-ton, 10 8·7-c.m. Q.F., 6 M., 2 l.	4 f. tu. or l. car.	1874	365,170	14·0	550	2500
c.d.s.b.	Frithjof (ex S.) (steel)	3500	240 0	49 3	17 9	2	4800	9½	8 barbette	.. 2″	3 24-c.m., 6 8·7-c.m. Q.F.	4 f. tu. or l. car	1891	175,000	16·0	..	..
c.d.s.b.	Hagen . (steel)	3500	240 0	49 3	17 9	2	4800	9½	8 barbette	.. 2″	3 24-c.m., 6 8·7-c.m. Q.F.	4 f. tu. or l. car	1893	..	16·0	..	..
c.d.s.b.	Heimdal . (steel)	3500	240 0	49 3	17 9	2	4800	9½	8 barbette	.. 2″	3 24-c.m. 19-ton Krupp, 6 8¾-c.m. Q.F.	4 f. tu. or l. car	1892	233,500	16·0	..	..
c.d.s.b.	Hildebrand. (steel)	3500	240 0	49 3	17 9	2	4800	9½	8 barbette	.. 2″	3 24-c.m. 19-ton Krupp, 6 8¾-c.m. Q.F.	4 f. tu. or l. car	1892	218,000	16.0	..	..
a.g.b.	Hummel . (iron)	1109	143 0	35 6	10 2	1	700	8	8 turret	8 2″	1 30½-c.m. 35-ton, 2 M. . .	1 f. tu.	1881	56,741	10·0	40	..
c.b. 2nd class	Kaiser . (iron)	7676	280 0	62 4	24 7	1	7803	10	8	10 2″	8 26-c.m. 23-ton, 1 21-c.m., 7 15-c.m. 4-ton, 6 M., 4 l.	5 f. tu. or l. car	1874	411,301	14·6	710	3400
br. 3rd class	König Wilhelm (iron)	9757	355 0	60 0	26 7	1	8350	8	7	10	18 24-c.m. 14½-ton, 5 21-c.m. 13-ton, 6 15-c.m. 4-ton, 6 M, 4 l.	5 f. tu. or l. car	1868	505,141	14·7	700	1740
b. 1st class	Kurfürst Friedrich Wilhelm. (steel)	9842	354 4	64 0	24 7	2	9500	15¾ to 11¾ comp.	11¾ barbette comp.	8 2½	6 28-c.m., 6 10½-c.m. Q.F., 8 8·7-c.m. do. & M.	7 f. tu. or l. car	1891	..	15·0	..	..
a.g.b.	Mücke . . (iron)	1109	143 0	35 6	10 2	2	700	8	8 turret	8 2″	1 30½-c.m. 35-ton, 2 M. . .	1 f. tu.	1877	60,960	10·0	40	..
„	Natter . . (iron)	1109	143 0	35 6	10 2	2	700	8	8 turret	8 2″	1 30½-c.m. 35-ton, 2 M. . .	1 f. tu.	1880	52,822	10·0	40	..
b. 2nd class	Oldenburg (steel)	5200	246 0	59 0	19 6	2	3900	13(comp'nd)	8 compound	.. 1½″	8 24-c.m. 18-ton Krupp, 2 8¾-c.m. Q.F., 6 M.	4 f. tu. or l. car	1884	235,342	13·5	250	..
t. 3rd class	Preussen . (iron)	6770	308 6	53 6	24 7	1	4383	9	8 breastwork 10 turret	8	4 26-c.m. 18-ton Krupp, 2 17-c.m. 10 8·7-c.m. Q.F., 6 M., 2 l.	4 f. tu. or l. car	1873	351,904	14·0	550	2500
b. 2nd class	Sachsen . (iron)	7400	298 0	60 0	19 8	2	5600	16	10 barbette	8 2″	6 26-c.m. 18-ton Krupp, 4 10½-c.m. Q.F., 6 M., 2 l.	4 f. tu. or l. car	1877	422,178	14·0	700	..
a.g.b.	Salamander . (iron)	1109	143 0	35 6	10 2	2	700	8	8 turret	8 2″	1 30½-c.m. 35-ton, 2 M. . .	1 f. tu.	1880	56,914	10·0	40	..
„	Skorpion . (iron)	1109	143 0	35 6	10 2	2	700	8	8 turret	8 2″	1 30½-c.m. 35-ton, 2 M. . .	1 f. tu.	1877	60,796	10·0	40	..
c.d.s.b.	Siegfried . (steel)	3500	240 0	49 3	17 9	2	4800	9½	8 barbette	.. 2″	3 24-c.m. 19-ton, 6 8¾-c.m. Q.F.	4 f. tu. or l. car	1889	175,000	15·0	..	..
„	T (new ship) (steel)	3500	240 0	49 3	17 9	2	4800	9½	8 barbette	.. 2″	3 24-c.m. 19-ton, 6 8¾-c.m. Q.F.	4 f. tu. or l. car	Bldg.	233,500	16·0	..	..
„	V (new ship) (steel)	3500	240 0	49 3	17 9	..	4800	9½	8 barbette	.. 2″	3 24-c.m. 19-ton, 6 8¾-c.m. Q.F.	4 f. tu. or l. car	Bldg.	233,500	16·0	..	..
a.g.b.	Viper . . (iron)	1109	143 0	35 6	10 2	2	700	8	8 turret	8 2″	1 30½-c.m. 35-ton, 2 M. . .	1 f. tu.	1876	61,463	10·0	40	400 at 9 knots
„	Wespe . . (iron)	1109	143 0	35 6	10 2	2	700	8	8 turret	8 2″	1 30½-c.m. 35-ton, 2 M. . .	1 f. tu.	1876	53,771	10·0	40	360 at 9 knots
b. 1st class	Weissemburg (steel)	9842	354 4	64 0	24 7	2	9500	15¾ to 11¾	11¾ barbette	8 2½″	6 28-c.m., 6 10½-c.m. Q.F., 8 8·7-c.m. do. & M.	7 f. tu. or l. car	1891	619,475	16·0	..	..
b. 1st class	Wœrth . . (steel)	9842	354 4	64 0	24 7	2	9500	15¾ to 11¾	11¾ barbette	8 2½	6 28-c.m. 6 10½-c.m. Q.F., 8 8.7 c.m. do. & M.	4 f. tu. or l. car	1892	..	16·0	..	..
b. 2nd class	Wurttemberg (iron)	7400	298 0	60 0	19 8	2	5600	16	10 barbette	8 2″	6 26-c.m. 18-ton Krupp 4 10½-c.m. Q.F., 6 M., 2 l.	4 f. tu. or l. car	1878	402,512	14·0	700	..

(*a*) To replace the Preussen and Leipzig. *Cf.* Navy Estimates.
The Arminius, Friedrich Carl, and Kronprinz are now used for harbour service.

GERMANY.—Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at ten knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
cr. 3rd class	Alexandrine	2373	236 3	42 7	18 4	1	2400	iron, steel, and wood	12 15-c.m. 4-ton, 2 8·7-c.m. Q.F., 4 M., 1 l.	1 f. tu. or l. car	1885	102,877	15·0	..	..
cr. 3rd class	Arcona	2373	236 3	42 7	18 4	1	2400	"	12 15-c.m. 4-ton 2 8·7-c.m. Q.F., 4 M., 1 l.	1 f. tu. or l. car	1885	109,875	15·0	..	..
cr. 3rd class	Blitz	1382	246 0	32 10	13 5	2	2839	"	5 8·7-c.m. 9-cwt., 4 M.	1 f. tu. or l. car	1882	66,935	16·0	..	..
cr.	Blücher (Torpedo school)	2856	244 4	44 10	19 8	1	2990	iron & wood	16 15-c.m., 6 M., 2 l.	6 f. tu. or l. car	1877	136,408	14·0	..	..
to.r.	Bremse P. 2½"	866	203 5	27 10	10 6	..	1500	steel	1 21-c.m. 9-ton.	..	1884	49,308	15·0	65	..
cr. 3rd class	Buzzard	1580	256 0	30 2	..	2	2800	"	8 10½-c.m. Q.F. 4 M.	2 l. car.	1890	..	16·5	..	..
to.r.	Brummer P. 2½"	866	203 5	27 10	10 6	..	1500	"	1 21-c.m. 9-ton.	..	1884	52,422	15·0	65	..
cr. 3rd class	Carola	2169	226 4	42 7	18 4	1	2340	iron and wood	8 15-c.m. 3½-ton, 4 8·7-c.m. 4 M.	..	1880	109,617	14·0	..	2000
cr. 3rd class	F (new ship)	..	..	..	..	..	..	..	.. ..	..	Bldg.	113,250	..	..	..
cr. 3rd class	Falke	1600	246 0	33 6	15 0	2	1600	"	8 10½-c.m. Q.F., 4 M.	2 l. car.	1891	..	15 5	..	..
cr. 3rd class	Freya	2017	259 2	35 0	17 4	1	2471	composite	8 15-c.m. 4 M., 1 l.	..	1874	106,868	15 0	..	..
cr.	Dynamite Cruiser	1030	..	..	..	2	..	steel	Dynamite guns	..	Bldg.	..	22·0	..	..
cr. 3rd class	Gefion P. 3"	(a) 5000	344 6	48 8	..	2	9800	..	6 15-c.m. Q.F., 6 l.	6 f. tu. or l. car	1893	..	20·0	..	..
cr. 3rd class	Greif	2000	318 0	32 0	13 0	2	5400	steel	2 10½-c.m. 23-cwt., 10 M.	..	1886	..	23·0	..	..
d.v.	H (new ship)	979	262 6	31 2	13 9	2	5000	steel	4 8¾-c.m. Q.F., 9 smaller do. and M.	1 l. car.	Bldg.	113,350	21.0	..	..
g.v.	Habicht	848	174 0	29 6	11 5	1	875	composite	1 15-c.m. 4 12-c.m. 4 8·7-c.m. Q.F.	..	1879	33,054	12·0	..	..
g.b.	Hyäne	489	139 8	25 1	9 10	1	340	iron	2 10½-c.m., 2 l.	..	1878	24,340	9·0	..	..
g.b.	Iltis	489	139 8	25 1	9 10	1	380	"	2 10½-c.m., 2 l.	..	1878	27,480	9·0	..	..
cr. 2nd class	Irene P.	4400	339 6	46 0	21 0	2	8000	steel	6 15-c.m. 4-ton, 8 15-c.m. 3½-ton, 8 M.	4 f. tu. or l. car	1887	220,000	19·8	900	..
cr. 3rd class	Jagd P.	1240	275 6	31 6	13 9	2	4000	"	4 10½-c.m. 23-cwt., 10 M.	..	1888	..	20·0	..	..
cr. 1st class	Kaiserin Augusta P. 3"	6052	393 0	49 3	23 0	3	12,000	"	12 long 15-c.m., 8 8·7-c.m. Q.F.	5 f. tu. or l. car	1892	..	(b) 20·0	..	10,000
to.g.b.	Komet	946	262 6	31 2	13 9	2	5000	"	4 8¾-c.m. Q.F., 9 smaller Q.F. and M.	1 l. car.	1892	..	21·0	..	..
cr. 3rd class	Kondor	1640	246 0	33 6	15 0	2	2800	steel & wood	8 10½-c.m., 4 M.	2 l. car.	1892	..	16·5	..	..
cr. 3rd class	Kormoran	1640	246 0	33 6	15 0	2	2800	steel & wood	8 10½-c.m. Q.F., 4 M.	2 l. car	1892	..	16·0	..	..
cr. 3rd class	Marie	2100	226 4	42 7	18 4	1	2257	iron & wood	8 15-c.m. 3½-ton, 2 8·7-c.m. 4 M.	1 f. tu. or l. car	1881	..	13·5	..	2000
d.v.	Meteor	946	262 6	29 6	11 6	2	4500	steel	4 8¾-c.m., 7 Q.F., 2 M.	1 l. car	1890	..	21·0	..	..
g.v.	Möwe	848	174 0	29 6	11 5	1	784	composite	1 15-c.m., 4 12-c.m., 4 8·7-c.m.	..	1879	33,390	12·0	..	..
cr. 3rd class	Nixe	1722	..	..	..	..	..	..	..	..	1885	..	10·5	..	..
cr. 3rd class	Olga	2100	226 4	42 7	18 4	1	2397	iron & wood (sheathed)	8 15-c.m. 3½-ton, 2 8·7-c.m., 4 M.	..	1880	113,812	14·0	..	2000
cr. 3rd class	Pfeil	1382	246 0	32 10	13 5	2	2700	steel	4 8·7-c.m. 4 M.	1 f. tu.	1882	73,605	16·0	..	..
cr. 2nd class	Prinzess Wilhelm P. 3"	4400	339 6	46 0	21 0	2	8000	"	6 15-c.m. 4-ton, 8 15-c.m. 3½-ton, 8 M.	4 f. tu. 1 l. car.	1887	220,000	18·7	900	..
cr. 4th class	Schwalbe	1120	203 0	30 6	12 4	2	1500	composite	8 10½-c.m. Krupp, 4 M.	..	1887	..	13·5	..	..
cr. 3rd class	See-Adler	1640	246 0	33 6	15 0	2	2800	steel & wood	8 10½-c.m., 4 M.	2 l. car.	1892	..	16·0	..	..
cr. 3rd class	Sophie	2100	226 4	42 7	18 4	1	2100	iron & wood	8 15-c.m. 3½-ton, 2 8·7-c.m., 4 M.	..	1892	117,155	14·0	..	2000

(a) M. Weyl. Parliamentary Return gives 4232. Pola Almanach 4000 tons.

(b) Speed said to be 22 knots on trial.

GERMANY.—Unarmoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
cr. 4th class	Sperber	1120	236 0	29 8	12 6	2	1500	composite	8 10½-c.m., 4 M.	..	1888	..	13·5	..	..
cr. 3rd class	Wacht P.	1240	275 6	31 6	13 9	2	4000	steel	4 10½-c.m. 23 cwt., 10 M.	..	1887	..	19·6	..	..
g.b.	Wolf	489	139 8	25 1	9 10	1	340	iron	2 10½-c.m. 23-cwt., 2 l.	..	1878	24,343	9·0	..	..
d.v.	Zieten	975	196 10	29 6	11 6	1	2323	"	4 12-c.m. 27-cwt., 4 M.	..	1876	81,755	16·0	140	..
to. g.b.	2 Torpedo Gunboats (1 under-water torpedo discharge)	380	..	..	..	2	..	steel	6 Q.F.	3 l. car.	1891	..	26·0	..	..
"	2 Torpedo Gunboats	350	213 0	..	..	2	4000	"	6 Q.F.	3 l. car.	1890 & 1891	..	26·0	..	..
"	2 Torpedo Gunboats	320	190 0	23 0	9 6	2	3600	"	6 M.	3 l. car.	1889	..	22·0	..	..
"	2 Torpedo Gunboats	300	184 0	21 8	9 6	2	2500	"	6 M.	3 l. car.	1888	..	21·0	..	..

The Charlotte, Leipzig, Gneisenau, Moltke, Stein and Stosch are now used as schoolships.

Note.—The torpedo-gunboats (Torpedo-Division boats) of 300 tons and over are included in this list, though they will also be found in the torpedo-boat tables.

Merchant Cruisers (Auxiliaries to the German Navy).

To what Company belonging.	Name of Ship.	Length.	Breadth.	Draught of Water.	Displacement.	Indicated H.P.	Ocean* Speed.	When Built.	Armament of each Ship.
		ft. in.	ft. in.	ft. in.	tons.		knots.		
Hamburg-American S.S. Co.	Fürst Bismarck	502 0	50 10	23 3	10,500	16,400	19½	1891	8 15-c.m., 4 12½-c.m., 2 8·8-c.m. Q.F., 2 5·7-c.m. do., 14 M.
	Normannia	498 9	57 6	22 3	10,500	16,250	19	1890	
	Columbia	462 6	56 0	19 8	9,500	13,680	19	1889	
	Augusta Victoria	459 3	56 0	23 0	9,500	12,280	18	1889	
North German Lloyds	Spree	462 6	51 10	22 0	8,900	12,770	19	1890	
	Havel	462 6	51 10	22 3	8,900	12,770	19	1890	
	Lahn	449 6	49 0	22 0	7,700	9,500	18½	1887	

* These speeds are based on reports of actual passages across the Atlantic.

GREECE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse power.	Armour.		Backing.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
								Belt.	Battery.	Deck Plating.	Guns.	Fish Torpedo Dis-chargers					
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	ins.				£	knots.	tons.	
c.b.	Basileus Georgios (iron)	1774	200 2	32 10	15 6	2	2400	7	6	9	2 21-c.m. 10-ton (Krupp), 2 M., 4 l.	..	1867	..	12·0	210	..
b.	Hydra . (steel)	4885	320 0	51 10	18 0	2	7000	$11\frac{3}{4}$ 3″ above water	$13\frac{3}{4}$ & $11\frac{3}{4}$	.. 2″	3 27-c.m. Canet, 5 15-c.m. do., 7 57-m.m. Q.F., 16 M.	3 f. tu. or l. car	1889	..	17·0	..	..
br.	Olga (wood)	2060	230 0	59 0	18 0	1	1950	$4\frac{3}{4}$	4	..	4 17-c.m. $5\frac{1}{2}$-ton (Krupp), 2 17-c.m. $3\frac{1}{2}$-ton do., 4 M., 4 l.	..	1869	..	10·0	240	..
b.	Psara . .	4885	320 0	51 10	18 0	2	7000	$11\frac{3}{4}$ 3″ above water	$13\frac{3}{4}$ & $11\frac{3}{4}$	.. 2″	3 27-c.m. Canet, 5 15-c.m. do., 7 6-pdr. Q.F., 16 M.	3 f. tu. or l. car	1890	..	17·0	..	..
b.	Spetsai . .	4885	320 0	51 10	18 0	2	7000	$11\frac{3}{4}$ 3″ above water	$13\frac{3}{4}$ & $11\frac{3}{4}$	.. 2″	3 27-c.m. Canet, 4 15-c.m. do., 7 6-pdr. Q.F., 16 M.	3 f. tu. or l. car	1889	..	17·0	..	..

GREECE.—Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	
g.v.	Acheloos	420	138 0	24 11	11 6	1	400	steel	2 9·6-c.m. (Krupp), 3 M.	..	1884	..	10·0	50	..
g.v.	Alpheos	420	138 0	24 11	11 6	1	400	steel	2 9·6-c.m. (Krupp), 3 M.	..	1884	..	10·0	50	..
g.v.	Aphroessa	380	124 7	22 11	9 10	1	160	iron	1 8·7-c.m. (Krupp)	..	1858	..	9·0	30	..
g.v.	Eurotas	420	138 0	24 11	11 6	1	400	steel	2 9·6-c.m. (Krupp), 3 M.	..	1884	..	10·0	50	..
corv.	Hellas	1300	200 2	37 0	19 4	1	1500	wood	12 15-c.m. (Krupp), 2 M.	..	1878 (repaired)	..	11·0	230	..
cr.	Mykale	1000	210 6	32 6	..	2	1000	steel	2 M.	..	1880	..	..	..	..
corv.	Nauarchos Miaulis	1800	246 0	36 0	14 5	1	2200	iron and wood	3 17-c.m. 5½-ton (Krupp), 1 17-c.m. 3½-ton do. 2 M., 4 l.	..	1879	..	15·0	220	..
g.v.	Nauplion	380	124 7	22 11	9 10	1	160	iron	1 8·7-c.m. (Krupp)	..	1856	..	9·0	30	..
g.v.	Paralos	380	123 0	23 11	9 10	1	204	"	1 8·7-c.m. (Krupp), 1 M.	..	1858	..	8·0	60	..
g.v.	Peneus	420	138 0	24 11	12 6	1	400	steel	2 9·6-c.m. (Krupp), 3 M.	.	1884	..	10·55	50	..
g.v.	Plixaura	380	124 7	22 11	9 10	1	160	iron	1 8·7-c.m. (Krupp)	..	1856	..	9·0	55	..
g.v.	Salaminia	380	123 0	23 11	9 10	1	200	"	1 8·7-c.m. (Krupp), 1 M.	..	1858	..	8·0	60	..
corv.	Sfaktirea	1000	235 0	30 0	13 0	1	1700	steel	2 10-c.m. (Krupp), 2 M.	..	1885	..	14·5	100	..
g.v.	Syros	380	124 7	22 11	9 10	1	160	iron	1 8·7-c.m. (Krupp)	..	..	..	9·0	18	..

Torpedo depôt-ship.—Kanaris, 1100 tons, 500 I.H.P., 2 10-c.m. (Krupp) guns, 2 Whitehead torpedo-launching guns on broadside, 2 under-water torpedo tubes ahead. 14 knots speed.

There are also 2 gunboats, Ambrakia and Actæon, of 440 tons displacement, 380 horse-power, 10 knot speed, fitted with 1 26-c.m. Krupp gun and 2 machine guns.

ITALY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Citadel or Turret.	Backing. Deck Plating.	Armament. Guns.	Armament. White-head Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	ins.				£	knots.	tons.	knots.
t.	Affondatore . (iron)	4062	290 0	40 0	20 0	1	3240	5	5 turret	9 2″	2 28-ton (Armstrong), 6 12-c.m. Q.F., 4 57-m.m. do., 4 37-m.m. do., 2 l.	2 l. car.	1865	152,480	12·0	460	1647
„	Ammiraglio di St. Bon	9800	344 6	68 10	24 9	2	13,500	9¾–4	9¾ 4″ redoubt.	.. 3″–1½″	4 10-in., 8 6-in. Q.F., 8 4·7-in. do., 16 55-m.m. do.	5 f. tu. or l. car	Bldg.	..	18·0	1000	..
a.c.	Ancona . . (iron)	4460	256 0	50 0	25 0	1	2548	4½	4½	13¾	6 15-c.m., 6 12-c.m. Q.F., 8 57-m.m. do., 12 37-m.m. do., 2 l.	3 l. car.	1864	172,000	12·0	485	2000
b.	Andrea Doria (steel)	11,000	328 2	65 4	27 2	2	10,500	18 comp.	18 comp.	.. 3″	4 105-ton (Armstrong), 2 15-c.m. do., 4 12-c.m. Q.F., 10 57-m.m. do., 17 37-m.m. do., 2 l.	5 f. tu. or l. car (2 sub)	1885	..	16·1	850	4500
a.c.	Carlo Alberto . .	6500	325 0	59 0	23 7	2	13,000	..	..	..	.. ..	..	..	..	..	..	..
a.c.	Castelfidardo . (iron)	4250	256 0	50 0	21 11	1	2125	4½	4½	13¾	6 15-c.m., 6 12-c.m. Q.F., 8 57-m.m. do., 12 37-m.m. do., 2 l.	3 l. car.	1863	..	12·0	485	2600
t.	Dandolo (iron and steel)	11,202	340 11	64 9	26 7	2	7500	21½	18 turret	22¾ 2″	4 100-ton M.L.R. (Armstrong), 3 12-c.m. Q.F., 8 57-m.m. do., 22 37-m.m. do., 2 l.	4 f. tu. or l. car	1878	700,000	15·6	1000	3760
„	Duilio . (iron and steel)	11,138	340 11	64 9	26 7	2	7710	0 21½	18 turret	22¾ 2″	4 100-ton M.L.R. (Armstrong), 3 12-c.m. Q.F., 8 57-m.m. do., 22 37-m.m. do., 2 l.	4 f. tu. or l. car	1876	..	15·0	1000	3760
t.	Emanuele Filiberto (steel)	9800	344 6	68 10	24 9	2	13,500	9¾–4	9¾	3″–1½″	4 10-in., 8 6-in. Q.F., 8 4·7-in. do., 8 57-m.m. do., 12 37-m.m. do., 2 M.	5 f. tu. or l. car	Bldg.	..	18·0	1000	..
b.	Francesco Morosini (steel)	11,000	328 2	65 4	27 2	2	10,000	18 comp.	18 comp.	.. 3″	4 105-ton (Armstrong), 2 15-c.m., 4 12-c.m. Q.F., 10 57-m.m. do., 17 37-m.m. do., 2 l.	5 f. tu. or l. car (2 sub)	1885	..	17·0	850	4500
a.c.	Guiseppe Garibaldi .	6500	325 0	59 0	23 7	2	13,000	..	..	..	2 25-c.m., 10 15-c.m. Q.F., 6 12-c.m. do., 10 57-m.m. do., 10 37-m.m. do., 2 M., 2 l.	..	Bldg.	..	18·0	..	..
„	Italia . . (steel)	15,900	400 6	74 0	31 2	2	18,000	16-inch funnel op'nings comp.	19 comp.	22¾ 3″	4 100-ton (Armstrong), 8 15-c.m. 4-ton, 4 12-c.m. Q.F., 12 57-m.m. do., 24 37-m.m. do., 2 l.	4 f. tu. or l. car	1880	..	18·0	1650	6000
b.	Lepanto . (steel)	15,900	400 6	74 0	31 2	2	18,000	16-inch funnel op'nings	19 comp.	22¾ 3″	4 100-ton (Armstrong), 8 15-c.m. 4-ton, 4 12-c.m. Q.F., 12 57-m.m. do., 24 37-m.m. do., 2 l.	4 f. tu. or l. car	1883	..	18·38	1650	6000
a.c.	Marco Polo . . .	4390	327 0	46 6	19 0	2	10,000	4	..	1″	6 15-c.m. Q.F., 10 12-c.m. do. .	4 f. tu. or l. car	1890	..	19·0	..	..
a.c.	Maria Pia . (iron)	4268	256 0	49 4	22 7	1	2924	4½	4½	13¾	8 15-c.m. 5 12-c.m. Q.F., 6 57-m.m. do., 8 37-m.m. do., 2 l.	2 f. tu. or l. car	1863	..	12·0	485	2600
a.c.	Nino Bixio . . .	6500	To be built by contract.				14,000	..	..	..	.. .. ..	..	..	..	..	..	..
c.d.s. 2 batteries	Palestro . (wood)	6419	265 0	57 10	26 11	1	3496	8¾	6	24	1 25-ton M.L.R. (Armstrong), 6 25-c.m. 18-ton do., 6 M., 6 l.	2 f. tu. or l. car	1873	..	13·0	513	1780
c.d.s., c.b.	Principe Amedeo (*z*) . (wood)	5814	265 0	57 9	26 6	1	3413	8¾	6	24	1 25-ton M.L.R. (Armstrong), 6 25-c.m. 18-ton do., 6 M., 6 l.	2 f. tu. or l. car	1872	..	13·0	513	1780
b.	Re Umberto (steel)	13,298	400 0	76 9	28 6	2	19,500	4 steel on side	18	.. 3″	4 67-ton (Armstrong), 8 15-c.m. Q.F., 16 12-c.m. do., 15 57-m.m. do., 10 37-m.m. do., 2 l.	8 f. tu. or l. car	1888	1,000,000	(*a*) 18·2	1200	..
c.d.s., c.b.	Roma . . (wood)	5814	262 6	58 6	25 3	1	3000	4½	4½ battery	26	2 23-c.m., 6 M., 6 l.	2 l. car.	1865	..	13·0	511	1940
b.	Ruggiero di Lauria . (steel)	11,000	328 2	65 4	27 2	2	10,000	18 comp.	18 comp.	.. 3″	4 105-ton (Armstrong), 2 15-c.m. do., 4 12-c.m. Q.F., 10 57-m.m. do., 17 37-m.m. do., 2 l.	5 f. tu. or l. car (2 sub)	1884	..	17·0	850	4500
a.c.	San Martino . (iron)	4268	256 0	49 4	22 7	1	2620	4½	4½	14	8 15-c.m., 5 12-c.m. Q.F., 6 57-m.m. do., 8 37-m.m. do., 2 l.	2 f. tu. or l. car	1863	..	12·0	490	..
b.	Sardegna . (steel)	13,860	411 0	76 9	28 6	2	22,800	4 steel on side	14¼ comp.	.. 3″	4 67-ton (Armstrong), 8 15-c.m. Q.F., 16 4·7-in. do., 15 57-m.m. do., 10 3·7-c.m. do., 2 l.	5 f. tu. or l. car	1890	1,000,000	19·0	1200	..
„	Sicilia . . (steel)	13,298	400 0	76 9	28 6	2	19,500	4 steel on side	18 comp.	.. 3″	4 67-ton (Armstrong), 8 15-c.m. Q.F., 16 12-c.m. do., 15 57-m.m. do., 10 3·7-c.m. do., 2 l.	5 f. tu. or l car	1891	1,000,000	18·0	1200	..
a.c.	Varese	6500	325 0	59 0	23 7	2	13,000	6	6	..	2 25-c.m., 10 15-c.m. Q.F., 6 12-c.m. do., 10 57-m.m. do., 10 37-m.m. do., 2 M., 2 l.	..	Bldg.	..	18·0	..	..
a.c.	Vettor Pisani . .	6500	325 0	59 0	23 7	2	13,000	6	6	..	2 25-c.m., 10 15-c.m. Q.F., 6 12-c.m. do., 10 57-m.m. do., 10 37-m.m. do., 2 M., 2 l.	..	Bldg.	..	18·0	..	..

(*a*) She steamed 17·5 knots on a course between Naples and Capri.

ITALY.—Unarmoured Ships.

Class.	NAME.		Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armaments. Guns.	Armaments. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
			tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
d.v.	Agostino Barbarigo	.	656	216 6	23 11	10 10	1	1700	steel	5 57-m.m. Q.F., 2 M.	..	1879	..	15·5	210	1000
cr. 3rd class	Amerigo Vespucci	P. 1½"	2533	255 11	42 7	17 0	1	3340	"	6 15-c.m. 4-ton, 4 57-m.m. Q.F., 6 37-m.m. do., 2 l.	2 l. car.	1882	..	14·0	500	..
g.v.	Andrea Provana	.	649	167 4	26 3	10 2	1	1000	"	4 12-c.m., 2 M.	..	1884	..	13·0	120	..
d.v.	Archimede	.	770	230 0	26 3	10 0	1	1700	"	4 12-c.m., 4 M.	2 l. car	1887	..	16·0	210	..
to.g.b.	Aretusa	P. 1"	846	230 0	26 10	11 9	3	4420	"	1 12-c.m. Q.F., 6 57-m.m. do., and 3 37-m.m. do.	6 f. tu. or l.car	1891	..	20·7	180	..
cr. 3rd class	Calabria	P. 2"–1"	2380	262 6	39 6	16 7	2	6500	steel	4 15-c.m. Q.F., 6 12-c.m. do., 8 57-m.m. do., 12 37-m.m. do., 2 M.	3 f. tu or l.car	Bldg.	..	20·0	..	..
to.g.b.	Calatafimi	P. 1"	840	229 6	27 0	10 2	2	4000	"	1 12-c.m. Q.F., 6 57-m.m. do., 3 37-m.m. do.	6 f. tu. o l.car	1893	..	20·0	120	..
to.g.b.	Caprera	P. 1"	853	230 0	26 3	10 2	2	4800	"	1 12-c.m. Q.F., 6 57-m.m. do., 2 37-m.m. do.	6 l. car	Bldg.	..	19·0	..	..
g.v.	Cariddi	.	1050	177 2	28 6	12 5	1	956	wood	1 16-c.m., 2 12-c.m., 3 M.	..	1875	..	10·0	164	..
"	Castore	.	530	116 0	36 0	9 6	1	364	steel	1 12-c.m., 1 M.	..	1889	..	8·0	..	..
to.g.b.	Clio	P. 1"	840	246 0	25 6	11 9	3	4200	"	6 6-pdr. and 2 3-pdr. Q.F., 3 M.	5 l car	1892	..	20·0	180	..
to.g.b.	Confienza	.	740	230 0	25 6	9 0	3	1887	"	1 12 c.m. Q.F., 6 57-m.m. do., 3 37-m.m. do., 3 M.	4 f. tu or l.car	1887	..	17·0	180	..
cr. 3rd class	Cristoforo Colombo	P. 1½"	3466	249 0	36 0	17 6	..	3800	..	6 12-c.m., 4 57-m.m. Q.F., 4 37-m.m. do.	..	1892 Reblt	..	16·0	..	..
g.v.	Curtatone	.	1040	177 3	32 8	13 6	1	1100	steel	4 12-c.m. Q.F., 6 M.	..	1887	..	12·0	197	..
cr. 3rd class	Dogali	P. 2½"–1"	2020	250 0	37 0	14 6	2	7600	"	6 6-inch (Armstrong), 9 57-m.m. Q.F., 2 37-m.m. do., 1 l.	4 l. car	1887	170,000	19·66	480	..
cr. 3rd class	Elba	P. 2"–1"	2730	272 6	40 8	16 7	2	6500	"	4 15-c.m. Q.F., 6 12-c.m. do., 6 57-m.m. do.	4 l. car	1893	..	19·0	..	..
cr. 2nd class	Etna	P. 1½"	3530	282 2	42 7	19 0	2	7480	steel	2 25-c.m. (Armstrong), 6 15-c.m. do., 5 57-m.m. Q.F., 8 37-m.m. do., 1 l.	4 f. tu. or l.car	1885	64,000 (engines)	17·8	630	..
to.g.b.	Euridice	P. 1"	840	229 6	27 0	10 2	2	4000	"	1 12-c.m. Q.F., 6 37-m.m. do., 3 37-m.m., do.	6 f. tu. or l.car	1891	..	19·8	120	..
cr. 3rd class	Etruria	P. 2"–1"	2280	262 6	39 6	16 7	2	7609	steel	4 15-c.m. Q.F., 6 12-c.m. do., 8 57-m.m. do.	2 l. car.	1891	..	18·0	400	..
cr. 2nd class	Fieramosca	P. 1½"	3745	290 0	43 6	19 4	2	7700	"	2 25-c.m. 25-ton 6 6-inch Q.F., 5 57-m.m. do., 8 37-m.m. do., 1 l.	4 f. tu. or l.car	1888	..	17·5	590	..
cr. 3rd class	Flavio Gioja	P. 1½"	2533	255 11	42 7	17 0	1	5000	"	6 12-c.m., 4 57-m.m. Q.F., 6 37-m.m. do., 2 l.	2 f. tu. or l. car	1881	..	15·0	500	..
to.g.b.	Folgore	.	317	187 0	19 8	6 7	2	2400	"	2 6-pr. and 2 3-pr. Q.F., 1 M.	4 l. car. or f. tu.	1886	..	20·0	60	..
d.v.	Galileo	.	770	230 0	26 3	8 2	1	1700	"	4 12-c.m. 4 M.	2 l. car	1887	..	15·0	210	..
cr. 3rd class	Giovanni Bausan	P. 1½"	3068	275 7	42 7	18 4	2	6500		2 25-c.m. 24-ton (Armstrong), 6 15-c.m. 5-ton, 4 57-mm. Q.F., 8 37-m.m. do., 1 l.	3 f. tu. or l.car (1 sub.)	1883	160,000	17·5	600	5000
to.g.b.	Goito	.	740	230 0	25 6	11 9	2	2620	"	6 57-m.m. Q.F., 3 37-m.m. do.	5 f. tu. or l.car	1887	..	19·0	180	..
g.v.	Governolo	.	1040	177 3	32 10	14 4	1	1100	"	6 12-c.m. Q.F., 4 M.	..	1891	..	15·0	..	..
to.g.b.	Iride	P. 1"	840	229 6	27 0	10 2	2	4000	"	1 12-c.m. Q.F., 6 57-m.m. do., 2 37-m.m. do.	6 l. car.	1891	..	19·6	120	..
cr. 3rd class	Liguria	P. 2"–1"	2280	262 6	39 4	16 9	2	6800	"	4 15-c.m. Q.F., 6 12-c.m. do., 8 57-m.m. do., 8 M. (2 Maxims)	2 l. car.	1893	..	18·0	..	..
cr. 3rd class	Lombardia	P. 2"–1"	2280	262 6	39 6	16 7	2	7140	"	4 15-c.m. Q.F., 6 12-c.m. do., 8 57-m.m. do.	2 l. car.	1890	..	18·0	..	..
d.v.	Marcantonio Colonna	.	656	216 6	23 11	10 10	1	1700	"	5 57-m m. Q.F., 2 M.	..	1879	..	15·4	197	..
to.g.b.	Minerva	P. 1"	846	246 0	27 6	11 9	3	4800	"	1 12-c.m. Q.F., 6 57-m.m. do., 3 37-m.m. do., 3 M.	5 f. tu. or l.car	1892	..	19·0	180	..
"	Montebello	.	740	230 0	25 6	11 9	3	2776	"	6 57-m.m. Q.F., 5 37-m.m. do., 3 M.	4 f. tu. or l.car	1888	..	19·0	180	..
"	Monzambano	.	740	230 0	25 6	11 9	3	1953	"	6 57-m.m. Q.F., 3 37-m.m. do.	4 f. tu. or l.car	1888	..	17·0	180	..
cr. 3rd class	New Ship (Lombardia Type.)	P. 2"–1"	2500	..	..	..	..	..	..	..	..	Bldg.	..	18·0	..	..
to.g.b.	Partenope	P. 1"	840	246 0	27 6	11 9	3	4200	"	1 12-c.m. Q.F., 6 57-m.m. do., 2 37-m.m. do., 3 M.	5 f. tu. or l.car	1890	..	19·0	180	..
cr. 3rd class	Piemonte	P. 3"–1"	2500	300 0	38 0	15 0	2	12,000	"	6 6-in. Q.F., 6 4¾-in. do., 10 57-m.m. do., 6 37-m.m. do., 1 l., 4 M.	3 f. tu.	1888	..	21·0	600	13,000
g.v.	Poluce	.	530	116 0	36 0	9 6	1	..	iron	1 12-c.m., 1 M.	..	1889	..	8·0	..	..
d.v.	Rapido	.	1568	262 5	30 6	12 6	1	1920	"	5 57-m.m. Q.F., 2 M.	..	1876	..	13·4	300	2560
to.g.b.	Saetta	.	317	187 0	19 8	6 7	1	2400	steel	2 57-m.m. Q.F., 4 37-m.m. do., 2 M.	3 f. tu. or l.car	1887	..	20·0	90	..

ITALY.—Unarmoured Ships.—*continued*.

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armaments. Guns.	Armaments. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
cr.	Savoia (used as the Royal Yacht) P. 1½"	2850	275 6	42 7	17 0	1	5000	steel	6 57-m.m. Q.F., 6 37-m.m.	2 l.car.	1883	..	14·0	500	..
g.v.	Scilla	1050	177 2	28 6	12 5	1	826	wood	2 57-m.m. Q.F., 2 M.	..	1874	..	10·0	..	..
"	Sebastiano Veniero	649	170 0	26 3	10 6	1	1160	steel	4 12-c.m., 2 M.	..	1884	..	13·0	..	..
d.v.	Staffetta	1505	252 7	30 10	13 2	1	1800	iron	4 12-c.m., 2 M., 1 l.	1 l.car.	1876	..	13·5	300	3300
cr. 2nd class	Stromboli P. 1½"	3530	282 2	42 7	19 0	2	6252	steel	2 25-c.m. (Armstrong), 6 15-c.m. 4-ton do., 5 57-m.m. Q.F., 3 37-m.m. do., 1 l.	4 f. tu. or l.car	1886	64,000 (Engines)	17·0	630	..
to.g.b.	Tersicore P. 1"	840	246 0	25 6	11 9	3	4200	"	1 12-c.m. 6 6-pdr. Q.F., 2 3-pdr. do., 3 M.	..	1892	..	20·0	180	..
to.g.b.	Tripoli	740	230 0	25 10	11 9	2	2573	"	6 57-m.m. Q.F., 5 37-m.m. do.	5 f. tu. or l.car	1886	..	18·0	180	..
cr. 3rd class	Umbria P. 2"–1"	2280	262 6	39 6	16 7	2	6500	"	4 15-c.m. Q.F., 6 12-c.m. do.	4 l. car.	1891	..	19·0	..	..
to.g.b.	Urania P. 1"	846	230 0	27 0	11 2	2	4000	"	1 12-c.m. Q.F., 6 57-m.m. do., 2 37-m.m. do.	6 f. tu. or l.car	1891	60,000	20·0	180	..
"	Two new ships (M, N) P.	846	230 0	25 6	11 2	2	4000	"	1 12-c.m. Q.F., 6 57-m.m. do., 2 37-m.m. do.	6 f. tu. or l.car	Bldg.	60,000 each	20·0	180	..
d.v.	Vedetta	827	183 9	26 11	11 5	1	670	iron	4 12-c.m., 4 M., 1 l.	..	1866	..	11·0	137	..
cr. 2nd class	Vesuvio P. 1½"	3530	282 2	42 7	19 0	2	6820	"	2 25-c.m., 6 15-c.m. 4-ton, 5 57-m.m. Q.F., 3 37-m.m. do., 1 l.	4 f. tu. or l.car	1886	64,000 (Engines)	17·0	590	..
g.v.	Volturno	1040	177 3	32 8	14 4	1	1100	"	4 12-c.m., 4 M.	..	1887	..	13·0	197	..

Gunboats (Staunch class).—Guardiano and Sentinella, of 265 tons, and of about 250 I.H.P., and 6 small gunboats of 87 tons and 52 H.P.

Paddle despatch vessel.—Messaggiero, of 1020 tons and 15 knots speed.

There are eight large merchant steamers on the auxiliary list of 14 to 18 knots speed. Of these, three are fitted for two torpedo-launching apparatus, and all of them with 2 12-c.m. or 2 57-m.m., and 4 3-pdr. Q.F., and 7 M. guns.

JAPAN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour.		Backing.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
								Belt.	Battery.	Deck Plating.	Guns.	Fish Torpedo Dis-chargers					
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
c.b.	Fu-Soo . . . (iron)	3718	220 0	48 0	18 4	2	3500	7	9	..	4 24-c.m. 15-ton (Krupp), 2 17-c.m. 6-ton do., 4 l., 5 M.	..	1877	..	13·2	360	4500
a.c.	Hi-yei *. . (composite)	2200	231 0	40 9	17 4	1	2490	4½	..	..	3 17-c.m. 3½-ton (Krupp), 6 15-c.m. do.	..	1878	..	13·0	280	..
"	Kon-go * . (composite)	2200	231 0	40 9	17 4	1	2450	4½	..	..	3 17-c.m. 3½-ton (Krupp), 6 15-c.m. do.	..	1877	..	13·7	280	..
br.	Rio-jo . . (composite)	1459	213 3	34 5	17 4	1	975	4½	4	..	2 17-c.m. 6-ton (Krupp), 6 70-pdr. (Vavasseur), 2 l.	..	1864	..	9·0	350	..
a.c.	Tschiyoda . . (steel)	2450	308 0	42 6	14 0	2	5600	4½	..	.. 1″	10 12-c.m. Q.F., 14 4·7-c.m. do., 3 M.	3 l. car.	1889	..	19·0	240	..

* These are not armoured ships in the usual sense of the term. There is no armour as against end-on fire, and no armoured deck.

Two new armoured ships are building or to be built.

JAPAN.—Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.								knots.	tons.	knots.
g.v.	Akagi	615	164 0	27 0	10 0	..	700	steel	1 24-c.m. (Krupp), 1 12-c.m. do., 2 M.	..	1888	..	12·0	..	..
cr.	Akitsuschima P.	3150	302 0	42 7	18 5	2	8400	"	1 32-c.m. 12 12-c.m. Q.F., 6 M.	4 f. tu. or l. ca.	1892	..	19·0	..	..
"	Amaki	1030	200 0	29 6	13 9	1	720	wood	1 15-c.m. (Krupp), 4 12-c.m. do., 2 M.	..	1877	..	11·0	120	..
corv.	Asama (training ship)	1104	206 9	33 9	10 10	1	300 (nom.)	"	8 17-c.m. (Krupp), 4 4½-in. do. (Armstrong), 4 l.	..	..	..	..	..	..
g.v.	Atago	615	164 0	27 0	10 0	..	700	steel	4 15-c.m. (Krupp), 2 M.	..	1887	..	12·0	..	..
"	Banjo	595	154 0	25 0	12 0	1	590	wood	1 6-inch, 2 4¾-inch do., 1 M.	..	1879	..	10·0	107	..
corv.	Fuziyama (training ship)	1000	203 0	36 0	11 0	1	180 (n)	..	2 15-c.m. (Krupp), 1 6-inch Armstrong, 10 l.	..	1865	..	13·0	..	..
d.v.	Gwaki	600	146 4	25 3	12 2	1	650	wood	1 15-c.m. (Krupp), 2 12-c.m. do.	..	1878	..	10·0	..	..
c.d.s.	Hasidate P. 2"	4277	295 0	50 10	21 2	2	5400	steel 12" armour on barbette aft	1 32-c.m. (Canet), 11 12-c.m. Q.F., 6 3-pdr. 6 M.	4 f. tu. or l. car	1891	..	17·5	..	..
g.v.	Ho Sho	320	120 0	24 0	9 6	1	240	wood	1 7-in. M.L.R., 1 5½-in., 1 l.	..	1868	..	11·0	50	..
c.d.s.	Itsukusima P. 2"	4277	295 0	50 10	21 2	2	5400	steel 12" armour on barbette forward	1 32-c.m. (Canet), 11 12-c.m. do., 5 6-pdr. Q.F., 11 3-pdr. (Hotchkiss), 6 M.	4 f. tu. or l. car	1889	..	17·5	..	..
cr.	Kaimon	1490	210 0	32 0	16 5	1	1250	wood	1 17-c.m. 6-ton (Krupp), 6 12-c.m. do., 2 l.	..	1882	..	12·0	..	..
"	Katsuraki	1476	206 9	36 0	15 0	2	1600	composite	2 17-c.m. (Krupp), 5 12-c.m. do., 2 M.	2 l. car.	1885	..	13·0	..	..
g.v.	Maya	615	164 0	27 0	10 0	..	700	"	4 15-c.m. (Krupp), 2 M.	..	1886	..	12·0	60	..
c.d.s.	Metsuchima P. 2"	4277	295 0	50 10	21 2	2	5100	steel 12" armour on barbette forward	1 32-c.m. (Canet), 11 12-c.m. do., 5 6-pdr. Q.F., and 11 3-pdr. (Hotchkiss), 6 M.	4 f. tu. or l. car	1890	..	17·5	..	..
cr.	Muzasi	1476	206 9	36 0	15 0	2	1600	composite	2 17-c.m. (Krupp), 5 12-c.m. do., 2 M.	2 l. car.	1886	..	13·5	..	..
"	Naniwa P. 3"–2"	3650	300 0	46 0	18 6	2	7235	steel	2 26-c.m. 28 ton (Armstrong), 6 15-c.m. 5-ton (Krupp), 2 Q.F., 10 M.	4 f. tu or l. car	1885	..	18·72	800	9000 at 13 kts.
"	Nis-chin	1470	204 0	29 0	14 6	1	1270	wood	1 7-in. M.L.R. (Armstrong), 5 12-c.m. (Krupp)	..	1869	..	11·0	217	..
to.g.b.	New Ship	875	240 0	27 6	..	..	..	steel	2 4·7 Q.F., 4 3-pr. do.	5 f. tu. or l. car	Bldg	..	21·0	..	..
g.v.	Oschima	640	..	..	..	..	1200	steel	4 12-c.m. Q.F., 8 47-m.m. do.	..	1890	..	..	..	..
cr.	Sei-ki	810	200 0	30 0	13 2	1	720	steel	1 15-c.m. (Krupp), 4 12-c.m. do., 2 M.	..	1875	..	11·0	130	..
"	Takao	1760	230 0	33 0	13 0	2	2330	steel & wood	4 6-in. Q.F., 1 4¾-in. do.	2 f. tu. or l. car	1888	..	15·0	300	..
"	Takachiho P. 3"–2"	3650	300 0	46 0	18 6	2	7500	steel	2 26-c.m. 28-ton (Armstrong), 6 15-c.m. 5-ton do., 2 Q.F., 10 M.	4 f. tu. or l. car	1885	..	18·72	800	9000 at 13 kts.
to.g.b.	Tatsuta	875	240 0	27 6	..	2	5500	"	2 4·7-in. Q.F., 4 3-pdr. do.	5 f. tu. or l. car	1894	..	20·0	200	..
"	Ten-rio	1490	200 0	32 0	16 5	1	1250	wood	1 17-c.m. 6-ton (Krupp), 6 12-c.m. do., 2 l.	..	1882	..	12·0	256	..
g.v.	Tiokai	615	154 0	27 0	10 0	..	700	steel	1 21-c.m. Krupp, 1 12-c.m. do., 2 M.	..	1887	..	10·0	..	..
"	Tisima	700	151 0	26 3	16 0	..	750	"	. . . .	..	1889	..	..	..	..
corv.	Tsukuba (training ship for cadets)	1980	194 0	36 0	18 0	1	350	wood	8 guns	..	1883	..	..	..	..
cr.	Tsukushi	1500	210 0	32 0	15 0	2	2887	steel	2 10-in. 25-ton (Armstrong), 4 4-in. do., 2 l., 4 M.	2 f. tu. or l. car	1882	..	17·0	250	..
"	Yaeyama	1600	315 0	34 6	15 0	2	5400	..	3 12-c.m. 6 M.	2 l. car.	1889	..	20·0	..	..
"	Yamato	1476	206 9	36 0	15 0	1	1600	steel	2 17-c.m. (Krupp), 5 12-c.m. do., 8 M.	2 f. tu. or l. car	1885	..	13·5	..	..
"	Yoshino " P. 4½"–1¾"	4150	350 0	46 6	17 0	2	15,000	"	4 6-in. Q.F., 8 4·7-in. do., 22 3-pdr. do.	5 f. tu. or l. car	1892	..	23·03	1000	..

Two paddle despatch vessels, of 1200 to 1500 tons displacement, and 1200 to 1400 HP.

NETHERLANDS.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Turret.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
c.d.s.t.	Bloedhond . (iron)	1530	180 0	46 3	9 6	2	680	5½	8	9¾	1 28-c.m. 28-ton (Krupp), 1 75-m.m. do., 2 3-pdr. Q.F., 2 M.	..	1869	..	8·50	90	..
„	Buffel . . (iron)	2198	195 6	40 0	15 6	2	2000	6	8	9¾ 1″	1 28-c.m. 28-ton (Krupp), 2 75-m.m. do., 4 3-pdr. Q.F., 2 M.	..	1868	..	12·40	150	..
„	Cerberus . . (iron)	1530	180 0	44 0	9 7	2	617	5½	8	9¾	1 28-c.m. 28-ton (Krupp), 1 75-m.m. do., 2 3-pdr. Q.F., 2 M.	..	1869	..	7·0	90	..
„	Draak . . (iron)	2156	201 5	49 3	10 10	2	807	8	9	11¾	2 28-c.m. (Krupp), 1 75-m.m. do., 2 3-pdr. Q.F., 2 M.	..	1877	..	8·00	100	..
„	Evertsen . (steel)	3400	283 0	47 0	16 9	2	..	6	9½	.. 2½″	3 21-c.m., 2 15-c.m., 6 75-m.m. Q.F., 4 37-m.m. do.	3 f. tu. or l. car	Bldg.	..	20·0	..	..
„	Guinea . . (iron)	2378	195 6	40 0	16 9	2	2000	6	8	9¾ 1″	1 28-c.m. 28-ton (Krupp), 2 75-m.m. do., 4 3-pdr. Q.F., 2 M.	..	1870	..	12·00	135	..
„	Haai . . (iron)	1566	186 4	44 0	10 2	2	672	5½	8 5¼ C. T.	9¾	1 28-c.m. 28-ton (Krupp), 1 75-m.m. do., 2 3-pdr. Q.F., 2 M.	..	1871	..	8·00	70	..
„	Heiligerlee . (iron)	1530	180 0	43 7	9 6	2	630	5½	8 4¼ C. T.	9¾	1 28-c.m. 28-ton (Krupp), 1 75-m.m. do., 2 3-pdr. Q.F., 2 M.	...	1868	..	8·00	90	..
„	Hijena . . (iron)	1566	186 4	44 0	10 2	2	654	5½	8 5¼ C. T.	9¾	1 28-c.m. 28-ton (Krupp), 1 75-m.m. do., 2 3-pdr. Q.F., 2 M.	..	1871	..	7·00	70	..
a.g.b.	Isala . . (iron)	367	150 11	24 11	4 3	2	306	4	5	5 ⅝″	2 12-c.m. (Krupp) . .	..	1876	..	7·00	27	..
t.	Koning der Nederlanden (iron)	5400	269 0	49 3	20 0	2	4500	8	9 8 C. T.	11¾ 3″	4 28-c.m. 25-ton M.L.R. (Armstrong), 4 12-c.m. (Krupp), 2 75-m.m. do., 4 37-m.m. Q.F., 6 M.	..	1874	..	11·00	620	..
t. & b.	Koningin Wilhelmina der Niederlanden (I) (steel, copper sheathed)	4600	328 0	49 3	19 8	2	5900	..	11	.. 3″	1 28-c.m., 1 21-c.m., 2 17-c.m., 2 7·5, 4 75-m.m. Q.F., 6 37-m.m. do., 6 M.	3 f. tu. or l. car	1892	..	17·0	450	..
c.d.s.t.	Kortenaer . (steel)	3400	283 0	47 0	16 9	2	..	6	9½	.. 2½″	3 21-c.m., 2 15-c.m., 6 75-m.m. Q.F., 4 37-m.m. do.	3 f. tu. or l. car	Bldg.	..	20·0	..	..
c.d.s.t.	Krokodil . (iron)	1530	180 0	43 7	9 6	2	630	5½	8 4¼ C.T.	9¾	1 28-c.m. 28-ton (Krupp), 1 75-m.m. do., 2 3-pdr. Q.F., 2 M.	..	1868	..	8·00	90	..
c.d.s.t.	Luipaard . . (iron)	1525	186 4	44 0	9 2	2	680	5½	8 5¼ C. T.	9¾	1 28-c.m. 28-ton (Krupp), 1 75-m.m. do., 2 3-pdr. Q.F., 2 M.	..	1876	..	8·00	70	..
„	Matador . . (iron)	1935	201 5	49 3	10 2	2	691	5½	9	9¾	2 28-c.m. 28-ton (Krupp), 1 75-m.m. do., 2 3-pdr. Q.F., 2 M.	..	1878	..	7·00	100	..
a.g.b.	Merva . . (iron)	367	150 11	24 11	4 3	2	395	4	5	5 ⅝″	2 12-c.m. (Krupp) . . .	..	1879	..	7·00	27	..
„	Mosa . . (iron)	367	150 11	24 11	4 3	2	400	4	5	5 ⅝″	2 12-c.m. (Krupp) . . .	..	1878	..	7·00	27	..
b. Ram	Three New Ships (A 4, A 5, A 6) (steel)	3400	283 0	47 0	16 9	2	..	6	9½	.. 2½″	3 21-c.m., 2 15-c.m., 6 75-m.m. Q.F., 4 37-m.m. do.	3 f. tu. or l.car	Pro.	..	20·0	..	..
c.d.s.t.	Panter . . (iron)	1566	186 4	44 0	10 2	2	660	5½	8 5¼ C. T.	9¾	1 28-c.m. 28-ton (Krupp), 1 75-m.m. do., 2 3-pdr. Q.F., 2 M.	..	1870	..	7·00	70	..
c.d.s.t.	Piet-Hein . . .	3400	283 0	47 0	16 9	2	..	6	9½	.. 2½″	3 21-c.m., 2 15-c.m., 6 75-m.m. Q.F., 4 37-m.m. do.	3 f. tu. or l.car	Bldg.	..	20·0	..	..
t.	Prinz Hendrik der Nederlanden (iron)	3375	229 7	42 7	18 1	1	2000	4½	5½	9¾ ⅝″	4 23-c.m. 13-ton M.L.R. (Armstrong), 4 12-c.m. (Krupp), 2 75-m.m. do., 4 37-m.m. Q.F., 6 M.	..	1866	..	12·00	350	..
t. & b.	Reinier Claeszen (steel)	2490	229 7	44 3	15 0	2	2400	4¾ comp.	11	.. 3″	1 21-c.m. (Krupp), 1 17-c.m. do., 1 7·5-c.m. do., 3 3-pdr. Q.F., 3 M.	2 f. tu. or l.car	1891	..	16·5	160	..
a.g.b.	Rhenus . . (iron)	367	150 11	24 11	4 3	2	310	4	5	5 ⅝″	2 12-c.m. (Krupp) . . .	..	1877	..	7·00	27	..
c.d.s.t.	Schorpioen . (iron)	2175	193 3	38 0	15 10	2	2225	6	8 4¼ P.T.	11¾	1 28-c.m. 28-ton (Krupp), 2 75-m.m. do., 5 3-pdr. Q.F., 2 M.	..	1868	..	12·00	200	1030
„	Stier. . . (iron)	2069	194 10	38 0	15 6	2	2257	6	8 4¼ P. T.	9¾	1 28-c.m. 28-ton (Krupp), 2 75-m.m. do., 5 3-pdr. Q.F., 2 M.	..	1868	..	12·40	160	..
„	Tijger . . (iron)	1414	187 0	44 0	8 10	2	634	5½	8 4¼ C. T.	9¾	1 28-c.m. 28-ton (Krupp), 1 75-m.m. do., 2 3-pdr. Q.F., 2 M.	..	1868	..	8·00	70	..
a.g.b.	Vahalis . . (iron)	340	120 5	27 6	5 3	2	243	4½	..	7 ⅝″	2 3-pdr. Q.F.	..	1870	..	6·00	22	..
c.d.s.t.	Wesp . . (iron)	1566	186 4	44 0	10 2	2	744	5½	8 5¼ C.T.	9¾	1 28-c.m. 28-ton (Krupp), 1 75-m.m. do., 2 3-pdr. Q.F., 2 M.	..	1871	..	8·00	70	..

NETHERLANDS.—Unarmoured Ships.

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
cr.	Alkmaar	1010	154 3	30 2	15 9	1	732	composite	1 15-c.m. (Krupp), 6 12-c.m. do., 1 75-m.m. do., 2 37-m.m. Q.F., 2 M.	..	1874	..	10·0	130	..
g.v.	Aruba	778	147 7	29 6	12 5	1	413	"	1 15-c.m. M.L.R. (Armstrong), 2 12-c.m. (Krupp), 1 75-m.m. do., 2 37-m.m. Q.F., 2 M.	..	1873	..	9·0	100	..
cr. 1st class	Atjeh	3565	262 5	39 4	20 7	1	2700	iron & zinc sheathed	6 17-c.m. 6-ton, 8 12-c.m. (Krupp), 2 75-m.m., 8 3-pdr. Q.F., 6 M.	..	1876	..	14·5	380	3000
g.v.	Bali (I)	853	147 7	29 6	11 10	1	446	"	1 15-c.m., 3 12-c.m. do. (Krupp), 1 75-m.m., 2 37-m.m. Q.F.	..	1878	..	9·5	100	..
"	Banda (I)	645	137 10	27 7	11 10	1	198	composite	1 16-c.m. M.L.R., 2 12-c.m. (Krupp)	..	1872	..	9·0	80	..
"	Bandjermassin (I)	654	137 10	28 10	11 10	1	370	"	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. (Krupp), 1 75-m.m., 2 37-m.m. Q.F.	..	1874	..	9·5	85	..
"	Batavia (I)	853	147 7	29 6	11 10	1	405	iron & wood	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. (Krupp), 1 75-m.m., 2 37-m.m. Q.F.	..	1876	..	9·0	100	..
"	Benkoelen (I)	853	147 7	29 6	11 10	1	516	"	1 15-c.m., 3 12-c.m. (Krupp), 1 75-m.m., 2 37-m.m. Q.F.	..	1879	..	9·6	100	..
"	Bonaire	853	147 7	29 6	11 10	1	412	"	1 15-c.m., 2 12-c.m (Krupp), 1 75-m.m., 2 37-m.m. Q.F., 2 M.	..	1877	..	9·0	100	..
"	Borneo	829	177 2	33 10	12 6	..	1040	steel & wood	6 10½-c.m., 6 Q.F.	..	1892	..	13·0	..	..
g.v.	Brines	829	177 2	33 10	12 6	..	1040	"	6 10½-c.m., 6 Q.F.	..	1892	..	13·0	..	..
"	Ceram (I)	550	157 4	25 4	10 6	1	650	steel	3 12-c.m. (Krupp), 1 75-m.m., 2 37-m.m. Q.F.	..	1887	..	11·0	60	..
"	Condor (I)	320	126 0	21 0	10 0	1	300	composite	2 2½-in., 2 6-pdr. Q.F.	..	1885	..	10·0	25	..
cr. 1st class	De Ruyter	3480	262 5	39 4	20 7	1	3305	iron & zinc sheathed	6 17-c.m. 6-ton, 8 12-c.m. (Krupp), 2 75-m.m., 8 3-pdr. Q.F., 6 M.	..	1880	..	14·5	380	3000
g.v.	Flamingo	400	..	..	..	..	485	..	. . . .	..	1891	..	11·35	..	..
"	Flores (I)	550	157 0	25 6	10 6	1	650	steel	3 12-c.m. 2-ton, 1 75-m.m., 2 37-m.m. Q.F.	..	1887	..	11·0	60	..
"	Halik (I)	350	125 0	20 0	10 0	1	300	composite	2 2½-in. Q.F., 2 6-pdr. do.	..	1878	..	8·5	..	..
g.v.	Java (I)	1298	197 0	31 3	12 3	1	1055	iron & wood	1 6-in., 3 4¾-in., 1 75-m.m., 2 37-m.m., Q.F.	..	1885	..	10·6	125	..
cr. 1st class	Johan Willem Friso	3710	262 5	39 4	20 7	1	3000	iron & zinc sheathed	6 17-c.m. 6-ton (Krupp), 8 12-c.m., 2 75-m.m., 8 3-pdr. Q.F., 6 M.	2 l. car	1886	..	14·5	380	3000
cr. 1st class	Koningin Emma der Nederlanden	3565	262 5	39 4	20 7	1	2732	iron & zinc sheathed	6 17-c.m. 6-ton, 8 12-c.m. (Krupp), 2 75-m.m., 8 3-pdr. Q.F., 6 M.	..	1879	..	14·6	380	3000
g.v.	Lombok (I)	596	158 0	26 3	10 5	..	950	steel	3 4·7-in. Q.F., 1 3-in. do., 2 3-pdr. do.	..	1890	..	12·5	..	..
"	Macassar (I)	853	147 7	29 6	11 10	1	394	iron & wood	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. (Krupp), 1 75-m.m., 2 37-m.m. Q.F.	..	1876	..	9·0	100	..
"	Madura (I)	853	147 7	29 6	11 10	1	559	"	1 15-c.m., 3 12-c.m. (Krupp), 1 75-m.m., 2 37-m.m. Q.F.	..	1880	..	9·7	100	..
"	Padang (I)	853	147 7	29 6	11 10	1	409	"	1 15-c.m., 3 12-c.m. (Krupp), 1 75-m.m., 2 37-m.m. Q.F.	..	1878	..	9·4	100	..
"	Pelikaan (I)	400	158 0	26 3	10 5	..	485	steel	3 4·7-in. Q.F., 1 3-in. do., 2 3-pr. do.	..	1891	..	11·35	..	..
"	Pontianak (I)	654	147 7	29 6	11 10	1	360	composite	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. (Krupp) 1 75-m.m., 2 37-m.m. Q.F.	..	1873	..	8·5	85	..
"	Samarang (I)	853	147 7	29 6	11 10	1	460	iron & wood	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. (Krupp), 1 75-m.m., 2 37-m.m. Q.F.	..	1876	..	9·0	100	..
"	Sambas (I)	654	137 10	28 10	11 10	1	374	composite	1 18-c.m. 7-ton M.L.R. (Armstrong), 2 12-c.m. (Krupp), 1 75-m.m., 2 37-m.m. Q.F.	..	1874	..	8·5	85	..
sl.	Sommelsdijk	1013	147 7	31 2	11 9	1	722	iron & wood	1 15-c.m., 3 12-c.m. (Krupp), 1 75-m.m., 2 37-m.m. Q.F., 2 M.	..	1882	..	10·0	95	..
cr.	Sumatra P. 1½"	1700	216 6	36 9	14 0	2	3750	steel	1 21-c.m., 1 15-c.m., 2 12-c.m., 6 3-pdr. Q.F., 2 M.	2 f. tu. or l. car	1891	..	17·0	170	..
to.g.b.	New ships (4) (I)	450	..	..	..	2	..	..	2 75-m.m. Q.F., 4 5-c.m. do.	1 f. tu. or l. car	Bldg.	..	22·0	..	..
g.v.	Sumbawa (I)	600	158 0	26 3	10 5	..	950	steel	3 4·7-in. Q.F., 1 6-pdr. do., 2 3-pdr. do.	..	1891	..	12·5	..	..
"	New (I)	600	158 0	26 3	10 5	..	850	"	6 light guns	..	Bldg.	..	..	..	..
g.v.	Suriname	853	147 7	29 6	11 10	1	440	"	1 15-c.m. (Krupp), 3 12-c.m., 1 75-m.m., 2 37-m.m. Q.F., 2 M.	..	1877	..	9·0	95	
cr. 1st class	Tromp	3565	262 5	39 4	20 7	1	2772	"	6 17-c.m. 6-ton, 8 12-c.m. (Krupp), 2 75-m.m., 8 3-pdr. Q.F., 6 M.	..	1877	..	14·3	380	3000
corv.	Van Galen	2160	193 6	41 6	18 2	1	833	wood	10 12-c.m. (Krupp), 2 75-m.m., 2 37-m.m. Q.F.	..	1872	..	10·0	400	..
cr. 1st class	Van Speyk	3575	262 5	39 4	20 7	1	2891	iron & zinc sheathed	6 17-c.m. 6-ton, 8 12-c.m. (Krupp), 2 75-m.m., 8 3-pdr. Q.F., 6 M.	..	1882	..	14·2	380	3000
g.v.	Zwalur (I)	340	123 0	21 0	10 0	1	320	composite	2 3-in., 2 2-in.	..	1882	..	10·5	..	..

Sixteen Gunboats (*Staunch class*) of 245 tons, and of 100 to 171 H.P.; also *fourteen small gunboats*, of 195 tons, and 124 to 174 H.P., and *one steel gunboat* of 108 tons and 172 I.H.P. The new programme provides for the building of *fourteen gun vessels* of two different types for Home service.

NORWAY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Turret.	Armour. Belt.	Backing.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
c.s., t.	Mjölner (iron)	1515	203 5	45 11	11 10	1	450	12	5	39	2 27-c.m. 18-ton M.L.R. (Armstrong), 3 M., 1 l.	..	1868	66,800	8·0	138	..
a.g.b.	New vessel (steel)	395	..	..	..	..	..	..	..	..	.. .. ..	..	Bldg.	..	..	..	..
c.s., t.	Skorpionen (iron)	1447	200 2	45 11	11 6	1	350	12	5	39	2 27-c.m. 18-ton M.L.R. (Armstrong), 3 M., 1 l.	..	1866	..	6·0	138	..
”	Thor (iron)	2003	203 5	49 3	13 2	1	600	14¼	7	38	2 27-c.m. 20-ton M.L.R. (Armstrong), 3 M., 1 l.	..	1872	..	8·0	200	..
”	Thrudvang (iron)	1515	200 2	45 11	11 10	1	500	12	5	39	2 27-c.m. 18-ton M.L.R. (Armstrong), 3 M., 1 l.	..	1867	..	8·0	138	..

Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	tons.	tons.	knots.
g.b.	Ægir	393	108 6	29 6	8 0	2	450	steel	1 21-cm., 1 7-c.m. Q.F., 2 5-c.m. do.	..	1892	..	9·0	..	..
g.v.	Ellida	1000	187 0	32 8	14 4	2	900	wood	5 15-c.m. 4-ton (Krupp), 1 12-c.m. do., 1 l., 2 M.	1 f. tu. or l. car	1880	..	12·0	97	..
”	Heimdal	630	167 3	26 9	11 8	..	700	steel	4 6½-c.m. Q.F.	..	1891	..	12·0	22	..
to.g.b.	New	380	..	..	..	..	..	..	.. .. ..	..	Bldg.	33,000	..	..	..
corv.	Nord Stjernen	1609	216 6	39 4	17 9	1	800	wood	6 16-c.m. 3-ton M.L.R., 10 8-in. smooth-bore, 3 l.	..	1862	..	9·0	195	..
”	Nornen	959	172 0	36 0	15 9	1	240	”	6 16-c.m. and 6 12-c.m. guns, 2 3-pdr. Q.F., 2 l.	2 l. car.	1855	..	7·0	..	..
g.v.	Sleipner	580	173 10	25 11	9 6	2	800	iron	1 26-c.m. 22-ton (Krupp), 1 15-c.m. 4-ton do., 1 M.	1 f. tu. or l. car	1877	..	12·0	80	..
”	Viking P. 1½"	1113	203 6	30 6	13 0	2	2000	steel with belt of cellulose.	2 15-c.m., 4 6½-c.m. Q.F., 4 37-m.m. do., 2 M.	3 l. car.	1891	..	15·0	..	..

Nine Gunboats, of 189 to 280 tons, and of 100 to 450 I.HP., armed with one large gun and machine guns in each.
Sixteen smaller Gunboats, of 55 tons, 70 I.HP., and 7½ knots speed; each armed with one 5½-inch gun. Also several smaller gunboats.

PORTUGAL.—Armoured Ship.

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Battery.	Backing. Deck Protection.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
c.b.	Vasco da Gama (iron)	2422	200 0	40 0	18 0	2	3605	9	10	.. 3″	2 26-c.m. 18-ton (Krupp), 1 15-c.m. do., 2 65-m.m. Q.F., 2 M.	..	1876	103,800	13·2	300	..

Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
corv.	Affonso de Albuquerque	1111	205 0	33 2	12 3	1	1055	iron & wood	2 6-in. (Armstrong), 5 5-in. do., 3 M.	..	1884	..	12·0	150	..
"	Bartholomeu Dias	2377	207 0	37 5	20 6	1	400 (nom.)	wood	8 5-in.	..	1858	..	10·0	360	..
g.v.	Bengo	462	125 7	24 7	8 10	1	400	composite	1 6-in., 2 87-m.m.	..	1879	..	10·0	80	..
"	Diego Cam	587	143 0	25 11	10 10	1	400	"	2 15-c.m. 4-ton	..	1888	..	9·0	..	..
"	Diu	640	147 0	27 0	13 0	1	700	"	1 15-c.m. (Krupp), 2 87-m.m. do., 1 3-pdr. Q.F., 2 M.	..	1889	..	12·0	..	..
"	Dom Luiz I.	600	..	..	..	2	..	steel	4 10½-c.m., 3 65-m.m. Q.F., 3 M.	..	1891	..	11·0	..	..
"	New Ship	600	..	..	..	2	..	"	4 10½-c.m., 3 65-m.m. Q.F., 3 M.	..	Bldg.	..	11·0	..	..
"	Douro	587	143 0	25 11	10 10	1	400	wood	1 15-c.m. 4-ton, 2 5-in. do., 1 M.	..	1873	..	9·0	80	..

PORTUGAL.—Unarmoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Dis-chargers for Tor-pedoes.	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
corv.	Duque de Terceira	1418	180 2	34 2	14 9	1	220 (nom.)	wood	2 15-c.m. (Krupp), 2 65-m.m. Q.F., 2 M.	..	1864	..	10·0	200	..
"	Estephania	2368	202 5	41 4	17 8	1	400 (nom.)	"	1 7-in., 8 80-pdr. M.L. (Palliser)	..	1859	..	10·0	360	..
g.v.	Liberal	610	140 0	25 10	11 0	1	500	iron & wood	1 6-in. 4-ton (Armstrong), 2 4-in. do., 2 M.	..	1884	..	10·0	90	..
corv.	Mindello	1124	169 11	35 9	13 5	1	900	composite	2 7-in. 4-ton M.L.R. (Armstrong), 6 5-in. 2 l.	..	1876	..	11·0	100	..
g.v.	Mandovi	462	125 7	24 7	8 10	1	400	"	1 6-in., 2 9-c.m., 2 M.	..	1879	..	10 0	80	..
"	Quanza	587	143 0	25 11	10 10	1	500	wood	1 6-in. 4-ton, 2 5-in., 1 M.	..	1877	..	10·0	80	..
corv.	Rainha de Portugal	1124	169 11	35 9	13 5	1	900	composite	1 7-in. M.L.R. (Armstrong), 4 5-in. 2 l.	..	1876	..	11·0	100	..
g.v.	Rio Ave	380	120 0	22 0	10 0	1	300	wood	1 10 c.m., 2 7½-c.m. do.	..	1880	..	8·0	65	..
"	Rio Lima	610	148 11	28 3	10 6	1	500	iron & wood	1 15-c.m. 4-ton (Armstrong), 4 40-pdr. do	..	1875	..	10·0	90	..
"	Sado	610	148 11	28 3	10 6	1	500	composite	1 15-c.m. 4-ton (Armstrong), 4 40-pdr. do	..	1875	..	10·0	90	..
"	Tamega	610	148 11	28 3	10 6	1	500	"	1 15-c.m. 4-ton (Armstrong), 4 40-pdr. do.	..	1875	..	10·0	90	..
"	Tejo	587	143 0	25 11	10 10	1	400	wood	1 15-c.m. 4-ton, 2 40-pdr. do.	..	1869	..	10·0	80	..
"	Vouga	721	161 0	27 7	11 10	1	600	iron & wood	1 6-in., 4 4-in. do., 2 M.	..	1882	..	9·0	100	..
"	Zaire	558	140 0	25 10	11 10	1	500	"	1 6-in. (Armstrong), 2 4-in. do., 2 M.	..	1884	..	10·0	20	..
"	Zambezia	640	143 0	26 0	10 10	1	500	composite	1 6-in., 2 4-in. do., 2 M.	..	1886	.	9·0	80	..
cr.	4 Cruisers (not named) P. 2¾"	4700	334 9	46 9	20 0	2	11,000	steel	4 15-c.m., 4 65-m.m. Q.F., 4 M.	1. car.	Projctd.	..	21·0	850	5000

Five small Gunboats (station) of 159 to 340 tons displacement, and 11 to 12 knots speed.

RUSSIA.—Armoured Ships.

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Turret or Battery.	Backing. Deck Plating.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	ins.				£	knots.	tons.	knots.
c.d.s., t.	Adm. Chichagoff (iron)	3511	254 0	42 7	18 0	1	2060	6	6	17½	2 11-in. 28-ton, 6 Q.F., 4 l.	..	1868	..	10·5	300	..
”	Adm. Greig. (iron)	3593	254 0	42 7	17 6	1	2031	4½	6	17½	3 11-in. 28-ton, 6 Q.F., 2 l.	..	1868	..	10·0	300	.
”	Adm. Lazareff (iron)	3556	254 0	43 0	17 6	1	2004	4½	6	17½	3 11-in. 28-ton, 6 Q.F., 4 l.	..	1867	..	10·25	300	..
a.c.	Admiral Nachimoff (steel, copper sheathed)	7782	333 0	61 0	25 0	2	8000	10 comp.	8 barbette comp.	.. 3″	8 8-in., 10 6-in., 10 Q.F., 4 3-pdr. do., 6 M.	4 f. tu. or l.car	1885	572,000	16·7	1200	..
c.d.s.	Admiral Outshakoff.	4126	278 8	52 6	17 0	2	5000	10	..	.. 3″	4 10-in., 20 Q.F., 2 9-in., 4 6-in., 6 47-m.m. Q.F., 8 M.	4 f. tu. or l.car	1893	410,000	16·0	400	..
”	Admiral Senjavin.	4126	278 9	52 6	17 0	2	4250	10	..	.. 3″	4 9-in., 4 6-in. Q.F., 6 47-m.m. do., 8 37 m.m. do.	4 f. tu. or l. car	1893	410,000	16·0	400	..
c.d.s., t.	Adm. Spiridoff (iron)	3500	254 3	42 7	19 1	1	2007	6	6	17½	2 11-in. 28-ton, 6 Q.F., 4 l.	..	1868	..	10·5	300	..
b.	Alexander II. (steel, copper sheathed)	8440	326 0	67 0	23 0	2	8000	14 comp.	10 barbette comp. battery 4-inch.	.. 2½″	2 12-in. 50-ton, 4 9-in. 19-ton, 8 6-in., 4 6-pdr. Q.F., 4 3-pdr. do., 6 M.	5 f. tu. or l.car	1887	..	16·5	..	..
c.d.s., t.	Bronenosetz. (iron)	1482	200 0	45 11	11 6	1	481	5 1-in. plates	11 1-in. plates	.. 1″	2 9-in., 4 Q.F. and M.	..	1864	..	7·0	..	..
b. 1st class	Catherine II. B.S. (iron and steel)	10,180	331 0	69 0	26 6	2	11,000	16 comp.	14 barbette comp.	12 3″	6 12-in. (56-ton), 7 6-in., 8 6-pdr. Q.F., 6 M.	7 f. tu. or l.car	1886	900,000	15·5	886	1350 at 14 knots
c.d.s., t.	Charodeika (iron)	2026	206 9	42 7	10 6	2	700	4½	6 turret	17½ 1″	4 9-in., 2 Q.F. and 2 M.	..	1867	..	8·0	250	..
b.	Cizoi Veliky (No. 1).	8880	345 0	68 10	..	2	8500	16 comp.	14 barbette comp	..	4 12-in., 6 6-in., 12 47-mm. Q.F., 4 37-mm. do.	6 f. tu. or l.car	Bldg.	796,000	16·0	..	..
b.	Cizoi Veliky (No. 2). (Three Hierarchs.)	8880	345 6	68 10	..	2	8500	15¾ 5 above	11·8 & 10·2	.. 3″	4 11·8-in., 6 5·9-in. Q.F., 20 1·8-in. do. and 1 4-in. do.	6 f. tu.	Bldg.	..	16·5	800	2000
b.	Cizoi Veliky (No. 3).	8880	..	..	..	..	..	..	..	..	.. .. ..	..	Pro.	..	..	..	..
a.c.	Dimitri Donskoi (steel, copper sheathed)	5893	296 5	52 0	24 4	2	7000	6	unarmoured	.. 2½″	2 8-in., 12 6-in., 16 Q.F. and M., 4 l.	4 f. tu. or l.car	1883	..	16·5	400	4800

RUSSIA.—Armoured Ships—*continued.*

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.		Beam.		Draught of Water.		Propellers.	Indicated Horse-power.	Armour.		Backing.	Armament.		Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
											Belt.	Turret or Battery.	Deck Plating.	Guns. B.L.R. are of Russian Krupp pattern.	Fish Torpedo Dis-chargers					
		tons.	ft.	in.	ft.	in.	ft.	in.			inches.	inches.	ins.				£	knots.	tons.	knots.
t.	Dvenadsat Apostoloff (Twelve Apostles)	8076	330	0	60	0	25	6	2	11,500	14 comp.	12 (conning tower 5 ins.) comp.	.. 2½″	4 12-in. 52-ton, 4 6-in., 8 3-pdr. Q.F., 10 M.	6 f. tu. or l.car	1890	..	16·6	..	..
c.d.s., t.	Edinorog . (iron)	1407	201	0	46	0	11	6	1	460	5 1-in. plates	11 1-in. plates	39 1″	2 9-in. 15-ton, 2 Q.F. and 2 M.	..	1864	..	7·0	..	..
t.	Gangoot . (steel)	6592	278	0	62	0	21	0	2	8300	partial belt 16 comp.	armoured casemate	..	1 12-in., 4 9-in., 4 6-in., 10 Q.F.	5 f. tu. or l.car	1890	..	14·7	..	..
a.c.	General Admiral (iron, copper sheathed)	4604	285	5	49	3	21	0	1	4472	6	unarmoured	9¾	6 8-in., 2 6-in., 10 Q.F. and M., 5 l.	2 f. tu. or l.car	1873	..	14·2	1000	..
"	Gerzog Edinburgski (iron and wood)	4604	285	5	49	3	21	0	1	5222	6	unarmoured	9¾	4 8-in., 5 6-in., 12 Q.F., 6 l. .	2 f. tu. or l.car	1875	..	15·2	1000	..
b.	Gheorghy Pobyedo-nosets (steel)	10,280	320	0	69	0	26	7	2	10600	16 comp.	12 comp.	..	6 12-in. 56-ton, 7 6-in., 8 10-c.m. Q.F., 6 M.	7 f. tu. or l.car	1892	431,000	16·5	700	..
a.g.b.	Gremyastchy . "	1500	225	0	41	0	11	0	2	2000	5	..	.. 1½″	1 9-in., 1 6-in., 10 Q.F. .	2 f. tu. or l.car	1892	..	15·0	..	..
"	Grozyashtchy . "	1492	229	0	41	8	11	0	2	2000	5	..	.. 1½″	1 9-in., 1 6-in. 6-ton, 8 Q.F. .	2 f. tu. or l.car	1890	..	15·0	..	..
c.b.	Kniaz Pojarski (iron)	5007	272	4	49	3	23	11	1	2835	4½—3½	4½	..	2 8-in., 2 6-in., 10 Q.F. and M., 4 l.	..	1867	..	11·0	600	..
c.d.s., br.	Kreml . . .(iron)	3480	219	10	52	5	15	0	1	2822	4½	4½	17½	8 8-in., 6 6-in., 5 Q.F., 6 l. .	..	1864	..	9·0	..	..
a.c. 1st class	Minin . . .(iron)	5740	298	6	49	3	25	3	1	5290	7	..	..	4 8-in., 12 6-in, 16 Q.F., 4 l.	..	1878 altered	..	14·0	..	..

c.d.s.,br.	Netron-Menya .(iron)	3494	219	10	53	0	15	6	1	2393	4½	4½ battery	9¾	14 8-in., 4 Q.F., 2 M., 4 l.	1 l. car.	1864	..	9·0	500	..
t.	Navarin . (steel)	9476	338	0	67	0	25	0	2	9000	16	12 barbettes	..	4 12-in. 52-ton, 8 6-in., 14 Q.F. 4 l.	6 f. tu. or l. car	1891	772,995	16·0	700	..
t.	Nicolai I. (steel, copper sheathed)	8440	326	0	67	0	23	0	2	8000	14 comp.	10 turret 6-in. battery comp.	.. 2½″	2 12-in. 52-ton, 4 9-in. 19-ton, 8 6-in., 12 Q.F., 8 M., 4 l.	6 f. tu. or l. car	1888	453,000	14·8	..	..
circular c.d.s.	Novgorod, B.S. (iron, copper sheathed)	2706	101	0	101	0	13	0	6	2000	9—7	9	*	2 11-in., 8 Q.F., 2 M., 2 l.	..	1873	..	6·0	200	..
a.g.b.	Otvazny . . .	1500	225	0	41	0	11	0	2	2000	5	..	.. 1½″	1 9-in., 1 6-in., 10 Q.F.	2 f. tu. or l. car	1892	..	(a) 15·0		..
a.c. 1st class	Pamyat Azova (steel) (wood sheathing over armour)	6000	377	0	51	0	23	0	2	8000	9 comp.	8 barbette comp.	10 2½″	2 8-in., 13 6-in., 14 Q.F., and 3 M.	7 f. tu. or l. car	1888	350,000	18·8	1000	12,000
t. 1st class	Paris	12,480	357	6	72	2	27	0	2	10600	18—16 5 in. topsides	12	.. 3″	4 12-in., 12 5·9-in., 4 4·7-in. Q.F., 16 smaller do.	6 f. tu. or l. car	..	..	16·0	..	4,000
c.d.s.,br.	Pervenetz . .(iron)	3279	219	10	52	5	14	9	1	1067	4½	4½	9¾	6 8-in., 9 6-in., 15 Q.F. & M.	..	1863	..	9·0	..	..
t.	Peter the Great .(iron)	8749	328	2	62	4	23	9	2	8258	14—8	8+6 turret	9¾ 3″	4 12-in. 40-ton, 13 Q.F., 4 l.	1 f. tu. or l. car	1872	..	14·5	1200	..
t.	Petropaulowski (steel)	10,960	367	6	69	0	26	0	2	10600	15¾	10 4¾ small turrets.	.. 3½″	4 12-in., 8 8-in., 24 Q.F.	6 f. tu. or l. car	Bldg.	1,098,000	17 5	..	..
t.	Poltava . (steel)	10,960	367	6	69	0	26	0	2	10600	15¾	10 4¾ small turrets.	.. 3½″	4 12-in., 8 8-in., 24 Q.F.	6 f. tu. or l. car	1893	1,098,000	17·5	..	..
a.c.	Rossia . . (steel)	12,130	480	0	68	6	25	0	..	15000	..	..	..	4 8-in., 16 6-in., 6 4·7-in. Q.F., 18 small Q.F. & M.	6 f. tu. or l. car	1892	..	19·0 about	..	..
a.c.	Rurik . . (steel)	10,923	396	6	67	0	26	0	2	13250	10 comp.	..	2½	4 8-in., 16 6-in., 6 4·7-in. Q.F., 18 small Q.F. & M.	5 f. tu. or l. car	Bldg.	..	18·0	2000	20,000
„	New ship (Rurik type) (steel)	12,095	446	9	70	0	27	0	..	15000	..	..	..	4 8-in., 16 6-in., 6 4·7-in. Q.F., 18 small Q.F. & M.	6 f. tu. or l. car	Bldg.	858,600	19·0 about	..	..

* Hughes' Backing. (a) Stated to have attained only 13 knots on trial.

RUSSIA.—Armoured Ships—*continued.*

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Turret or Battery.	Backing. Deck Plating.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Fish Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	ins.				£	knots.	tons.	knots.
t.	Sevastopol . (steel)	10,960	367 6	69 0	26 0	2	13600	15¾	10 4¾ small turrets.	..	4 12-inch, 8 8-inch, 24 Q.F. .	6 f. tu. or l.car	Bldg.	1,098,000	17·5	..	..
b.	Sinope, B.S. (iron & steel)	10,180	331 0	69 0	26 6	2	13000	16 comp.	14 comp.	12 3″	6 12-in. 50-ton, 7 6-in. 8 Q.F., 6 M.	7 f. tu. or l.car	1887	900,000	16·75	886	1350 at 14 kts.
b.	Tchesmé, B.S. (iron & steel)	10,180	331 0	69 0	26 6	2	11000	16 comp.	14 comp.	12 3″	6 12-in. (50 ton), 7 6-in. 8 Q.F., 6 M.	7 f. tu. or l.car	1886	900,000	15·0	886	1350 at 14 kts.
"	Tria Sviatitelia . . (Three Saints.)	12,480	357 6	72 2	27 0	2	10600	18—16 5-in. topsides	16 5 upper.	.. 3″	4 12-inch, 12 6-inch Q.F., 4 4¾-inch do., 56 smaller Q.F. & M.	6 f. tu or l.car (2 sub.)	1893	..	16·0	1000	4000
circular c.d.s.	Vice-Admiral Popoff, (iron, copper sheathed) B.S.	3590	120 0	120 0	13 5	6	3066	16	16	9	2 12-in. 40-ton, 2 Q.F., 6 l. .	..	1875	..	8·0	250	..
a.c.	Vladimir Monomach (steel, copper sheathed)	5796	296 6	52 0	24 0	2	7000	6 comp.	unarmoured	.. 2″	4 8-in., 12 6-in, 18 Q.F. & M., 4 l.	2 f. tu. or l.car	1882	..	15·2	400	..

Ten old Monitors have been removed from this list.

RUSSIA.—Unarmoured Ships.

(Bal., Baltic Fleet; B.S., Black Sea Fleet; Sib., Siberian Squadron.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
cr. 2nd class	Admiral Korniloff, P. 2½″ Bal.	5000	351 0	48 6	20 0	2	9000	steel & wood sheathed	2 8-in., 14 6-in., 6 47-m.m. Q.F., 6 37-m.m. do., 5 l.	6 f. tu. or l. car	1887	296,000	17·5	..	..
cr. 3rd class	Afrika, Bal.	2852	285 5	39 4	17 1	1	1350	iron	3 6-in., 6 Q.F., 4 M., 4 l.	..	1877	..	13·0	..	..
cr. 3rd class	Asia, Bal.	2483	269 0	36 0	16 5	1	1100	iron	2 6-in., 5 Q.F., 6 M., 5 l.	..	1878	..	13·0	..	..
g.v.	Bobr, Sib.	950	187 0	35 2	9 6	2	1150	steel	1 9-in., 1 6-in., 5 Q.F., M., & 6 L.	..	1884	43,000	12·0	..	..
to.g.b.	Captain Sacken, B.S.	700	210 0	24 0	8 10	2	3400	”	7 4·7-in. Q.F., 7 M.	6 l. car.	1888	40,700	18·5	..	..
g.v.	Chernomoretz, B.S.	1224	210 0	35 0	11 1	1	2000	”	2 8-in., 1 6-in., 7 Q.F. & M.	2 f. tu. or l. car	1889	40,000	13·5	..	..
”	Coreetz, Sib.	1213	206 0	35 0	10 6	2	1500	”	2 8-in., 1 6-in., 2 Q.F., 4 l.	2 f. tu. or l. car	1886	..	13·5	..	..
corv.	Djigit, Bal.	1456	206 9	32 10	16 1	1	1700	iron & wood	3 6-in., 8 Q.F. & M., & 4 l.	..	1876	..	13·0	..	..
”	Donetz, B.S.	1224	210 0	35 0	11 0	1	2000	steel	2 8-in., 1 6-in., 7 Q.F. & M.	2 f. tu. or l. car	1887	40,000	13·5	..	..
to. g.b.	Gaidamak, Bal.	500	192 6	24 2	7 6	2	3000	”	2 47-m.m. Q.F., 7 37-m.m. do., 10 M.	3 l. car	1893	..	22·0	..	..
to.g.b.	Griden, B.S.	400	192 6	24 2	7 6	2	3500	”	2 47-m.m. Q.F., 7 37-m.m. do., 10M.	3 l. car	1893	66,600	22·0	..	..
g.v.	Jermak, Sib.	706	154 3	26 3	11 2	1	125	”	2 guns	..	1870	..	..	..	..
to.g.b.	Kazarsky, B.S.	411	190 0	24 0	8 6	2	3400	”	9 47-m.m. Q.F. (Hotchkiss)	2 l. car.	1890	32,500	21·0	90	4000
corv.	Kreyzer, Bal.	1542	206 9	32 10	16 1	1	1800	iron & wood	2 6-in., 7 Q.F., 1 M., 4 l.	..	1875	..	13·0	..	..
g.v.	Kubanetz, B.S.	1224	210 0	35 0	11 0	1	1500	steel	2 8-in. 10-ton, 1 6-in. do., 7 Q.F.	3 f. tu. or l. car	1888	40,000	13·8	..	..
to.g.b.	Lieutenant Ilyn, Bal.	600	230 0	24 0	8 10	2	3500	”	7 3-pdr. Q.F., 10 M.	7 f. tu. or l. car	1887	40,150	20·1	97	..
g.v.	Mandjur, Bal.	1224	210 0	35 0	11 0	2	1400	”	2 8-in., 1 6-in. do., 7 Q.F., M., & 4 l.	2 f. tu. or l. car	1886	..	14·0	..	..
corv.	Nayezdnik, Bal.	1334	206 9	32 10	14 0	1	1719	iron & wood	3 6-in., 7 Q.F. & M., 4 l.	..	1878	..	13·0	..	..

RUSSIA.—Unarmoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
corv.	Oprichnik, Bal.	1426	206 9	32 10	14 0	1	1268	steel & wood	3 6-in., 7 Q.F. & M., 4 l.	..	1880	..	13·0	..	..
cr. 2nd class	Pamyat Merkuriya, B.S.	3050	295 0	41 0	17 0	1	3000	iron & steel	6 6-in., 8 Q.F. & M., 4 l.	2 f. tu. or l. car.	1880	..	16·0	..	..
d.v.	Penderaklia, B.S.	1052	190 3	29 6	12 8	1	568	iron	3 guns	..	1877	..	..	..	..
sl.	Plastun, Bal.	1255	206 9	32 10	14 0	1	1268	iron & wood	3 6-in., 7 Q.F. & M., & 4 l.	..	1879	..	13·0	..	..
to.g.b.	Posadnik, Bal.	400	192 6	24 2	7 6	2	3000	steel	2 47-m.m. Q.F., 7 37-m.m. do., 3 M.	3 f. tu. or l. car	1892	111,000	22·0	..	..
to.g.b.	Two new ships	..	..	..	..	..	..	..	.. ..	..	Bldg.	..	..	..	..
corv.	Razboynik, Bal.	1329	206 9	32 10	14 0	1	1786	iron & wood	3 6-in., 7 Q.F. & M., & 4 l.	..	1878	125,000	13·0	..	..
cr. 3rd class	Rynda P. 1½"	2950	265 9	45 11	16 1	2	3000	steel & wood sheathed.	10 6-in., 9 Q.F., M., & 4 l.	4 f. tu. or l. car	1885	..	14·8	710	2400
g.v.	Sivootch, Sib.	950	187 0	35 0	9 6	2	1125	steel	1 9-in., 1 6-in., 5 Q.F., M., & 6 l.	..	1884	43,000	12·5	..	..
corv.	Strjelok, Bal.	1343	206 9	32 10	14 0	1	1528	iron & wood	3 6-in., 7 Q.F., M., & 4 l.	..	1880	..	13·0	..	..
g.v.	Teretz, B.S.	1224	210 0	35 0	11 0	..	1500	steel	2 8-in., 1 6-in. do., 7 Q.F. & M.	2 f. tu. or l. car	1888	40,000	13·8	..	..
"	Tunguz, Sib.	706	154 3	26 3	11 2	1	130	iron	4 guns	..	1870	..	..	..	..
"	Uraletz, B.S.	1224	210 0	35 0	11 0	..	1500	steel	2 8-in., 1 6-in. do., 7 Q.F. & M.	2 f. tu. or l. car	1888	40,000	13·8	..	..
to.g.b.	Voevada	400	192 6	24 2	7 6	2	3000	steel	2 47-m.m. Q.F., 7 37-m.m. do., 3 M.	3 f. tu. or l. car	1892	111,000	22·0	..	2500 at 14 knots
sl.	Vjestnik, Bal.	1255	206 9	32 10	14 2	1	1268	iron & wood sheathed.	3 6-in., 7 Q.F. & M., & 4 l.	..	1879	..	13·0	..	..
to.g.b.	Vzadnidk	500	192 6	24 2	7 6	2	3000	steel	4 47-m.m. Q.F., 7 37-m.m. do., 10 M., & l.	3 car.	1893	..	22·0	..	..
sl.	Zabiyaka, Bal.	1234	219 10	29 6	14 9	1	1470	iron	2 6-in., 6 Q.F., 4 M., 5 l.	..	1878	..	14·5	..	..
g.v.	Zaporojetz, B.S.	1200	210 0	35 0	10 0	2	1500	steel	2 8-in., 1 6-in., 7 Q.F. & M.	2 f. tu. or l. car	1887	40,000	13·5	..	..

Ten Gunboats, Staunch Class (*Baltic Fleet*) of 270 to 402 tons, 195 to 445 I.H.P., with 1 11-inch breech-loader, and 9 knots speed, and *two Gunboats* (*Baltic Fleet*) of about 200 tons and 7 knots speed.

Twelve Steamers (*Gun-vessels, Despatch-vessels, &c.*) (*Black Sea Fleet*) 90 to 298 tons.

Auxiliary Steamers.

Class.	NAME.	Material built of.	Where built.	When built.	Length. ft. in.	Breadth. ft. in.	Draught of Water. ft. in.	Displacement. tons.	Horse-power of Engines.	No. of Screws.	Speed in Knots.
	BLACK SEA CO.										
Auxiliary Cruiser	Czar	steel	Newcastle	1883	319 0	37 0	23 6	2240	350 nom.	1	16
"	Czarevna	"	"	1883	319 0	37 0	23 6	2240	350 nom.	1	16
"	Czaritza	"	"	1883	319 0	37 0	23 6	2240	350 nom.	1	16
"	Grand Duke Alexis	"	Hebburn	1890	284 0	37 0	14 9	2350	3500	1	16
"	Grand Duke Constantine	"	"	1891	284 0	37 0	15 0	2400	3500	1	16
"	Roumantzeff	"	"	1894	212 0	28 0	7 6	760	1000	2	13
	VOLUNTEER FLEET.										
"	Kostroma	"	"	1888	360 0	42 0	23 6	6830	2700	1	12
"	Moskva (was Kinfauns Castle)	"	Glasgow	1879	360 0	43 0	24 0	3050	2730	1	14
"	Orel	"	Hebburn	1889	445 0	48 0	23 6	7650	10,000	2	19
"	Petersburg	"	"	1894	460 0	52 0	24 0	9250	11,000	2	19
"	Russia (was Holsatia)	iron	"	1868	341 0	40 0	21 0	3100	2200	1	14
"	Saratoff	steel	"	1892	460 0	50 0	24 0	8750	10,000	2	19
"	Tamboff	"	Dumbarton	1893	385 0	45 0	24 6	4360	..	2	18
"	Vladivostock	"	Hebburn	1894	265 0	36 0	14 6	2700	1800	2	13
"	Yaraslav	"	Dumbarton	1893	385 0	45 0	24 6	4321	..	2	18

SPAIN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour: Belt.	Armour: Battery or Barbette	Backing: Deck Plating.	Armament: Guns.	Armament: Fish Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
a.c.b.	**Almirante Oquendo** (steel)	7000	340 0	65 0	21 6	2	13,000	12	10½ 12 C. T.	.. 3″–2″	2 28-c.m., 10 14-c.m. (all Hontoria), 8 57-m.m. Q.F., 8 37-m.m. do., 2 M.	6 f. tu. or l. car	1891	600,000	20·0	..	..
„	**Cardenal Cisneros** (steel)	7000	340 0	65 0	21 6	2	13,000	12	10½ 12 C. T.	.. 3″–2″	2 28-c.m., 10 14-c.m. (all Hontoria), 8 57-m.m. Q.F., 8 37-m.m. do., 2 M.	6 f tu. or l. car	Bldg.	600,000	20·0	..	..
„	**Cataluña** (steel)	7000	340 0	65 0	21 6	2	13,000	12	10½ 12 C. T.	.. 3″–2″	2 28-c.m., 10 14-c.m. (all Hontoria), 8 57-m.m. Q.F., 8 37-m.m. do., 2 M.	6 f. tu. or l. car	Bldg.	600,000	20·0	..	..
a.g.b.	**Duque de Tetuan** (Harbour Service) (iron)	703	141 0	31 2	6 10	2	190	4	4	9	1 16-c.m. (Parrot), 4 bronze smooth-bores.	..	1874	..	..	23	..
a.c.t.	**Emperador Carlos V.** (steel)	9235	364 0	69 0	22 0	2	15,000	12–6	10″ turret	.. 2″	2 28-c.m. (Hontoria), 10 14-c.m. do., 4 10-c.m., 2 7-c.m. Q.F., 5 M.	6 f. tu. or l. car	Bldg.	..	20·0	..	12,000
„	New ship . (steel)	9235	364 0	69 0	22 0	2	15,000	12–6	10″ turret	.. 2″	2 28-c.m. (Hontoria), 10 14-c.m. do., 4 10-c.m., 2 7-c.m. Q.F., 5 M.	6 f. tu. or l. car	Bldg.	..	20·0	..	12,000
a.c.b.	**Infanta Maria Teresa** (steel)	7000	340 0	65 0	21 6	2	13,758	12	10½ 12 C. T.	.. 3″–2″	2 28-c.m., 10 14-c.m. (all Hontoria), 8 57-m.m. Q.F., 8 37-m.m. do., 2 M.	6 f. tu. or l. car	1890	600,000	20·25	..	..
br.	**Numancia** (*a*) (iron)	7305	314 10	55 9	25 3	1	3708	5½	5	12	8 10-in. M.L.R. (Armstrong), 7 8-in. do., 1 20-c.m. (Hontoria), 8 M., 3 l.	2 f. tu. or l. car	1863	315,600	8·0	740	2450
b.	**Pelayo** . (steel)	9900	330 0	66 0	24 11	2	8000	17¾	19¼	.. 4″	2 32-c.m. 48-ton, 2 28-c.m. 38-ton, 1 16-c.m., 12 12-c.m., 6 Q.F., 12 M.	7 f. tu. or l. car	1887	..	16·0	700	..
a.c.b.	**Princesa de Asturias** (steel)	7000	340 0	65 0	21 6	2	13,000	12	10½ 12 C. T.	.. 3″–2″	2 28-c.m., 10 14-c.m. (all Hontoria), 1 9-c.m. do., 8 57-m.m. Q.F., 8 37-m.m. do., 2 M.	6 f. tu. or l. car	Bldg.	600,000	20·0	..	..
c.s., t.	**Puig-cerda** (iron Monitor)	553	127 11	29 6	6 7	2	328	4	4	9	1 16-c.m. (Palliser), 2 16-c.m. bronze smooth-bores.	..	1874	..	8·0	23	..
a.c.b.	**Vizcaya** . . .	7000	340 0	65 0	21 6	2	13,000	12	10½ 12 C. T.	.. 3″–2″	2 28-c.m. 10 14-c.m., 1 9-c.m. (all Hontoria), 8 57-m.m., 4 37-m.m. Q.F., 2 M.	6 f. tu. or l. car	1891	600,000	20.0	..	..
b.r.	**Vitoria** (iron)	7250	318 3	55 10	25 3	1	4500	5½	5	12	8 9-in. M.L.R. (Armstrong), 3 8-in. do., 1 20-c.m. (Hontoria), 8 M., 2 l.	2 f. tu. or l. car	1865	..	11·0	900	..
„	**Zaragoza** . (wood) (Torpedo School)	5620	278 10	55 10	24 7	1	3000	5	5	26	4 9-in. M.L.R. (Armstrong), 3 18-c.m. (Palliser), 8 16-c.m. do., 1 12-c.m., 6 8-c.m do., 2 M.	..	1867	..	8·0	700	..

Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament: Guns.	Armament: Fish Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
cr.	**Alfonso XII.** (*a*) . .	3090	278 10	42 7	16 5	1	4800	steel	6 16-c.m. (Hontoria), 2 7-c.m. do., 6 6-pdr. Q.F., 4 3-pdr. do., 5 M.	5 f. tu. or l. car	1887	..	17·5	600	..
„	**Alfonso XIII.** . . P. 4¾″–3″	5000	318 6	50 6	20 0	2	11,000	„	4 20-c.m. (Hontoria), 6 12-c.m. do., 6 57-m.m. Q.F., 6 37-m.m. do., 3 M.	5 f. tu. or l. car	1891	..	20·0	1100	..
„	**Aragon**	3342	246 0	45 11	20 11	1	4400	wood	6 16-c.m. (Hontoria), 6 8·7-c.m. (Krupp), 2 M.	..	1879	..	14·0	470	..
„	**Castilla**	3342	246 0	45 11	20 11	1	4400	„	4 15-c.m. (Krupp), 2 12-c.m. do., 4 7½-c.m. do., 8 Q.F., 2 M.	2 l. car	1881	..	14·0	470	..
„	**Concha**	524	157 5	25 7	8 7	2	600	iron	3 12-c.m. (Hontoria), 2 Q.F., 1 M. . .	1 l. car	1883	..	11·5	80	..
„	**Conde de Venadito** . .	1130	210 0	32 0	12 6	1	1600	„	4 12-c.m. (Hontoria), 2 Q.F., 7 M. . .	2 f. tu. or l. car	1888	..	14·0	220	..
„	**Cristobal Colon** . .	1130	210 0	32 0	12 6	1	1600	„	4 12-c.m. (Hontoria), 2 7-c.m. do., 2 Q.F., 5 M.	2 f. tu. or l. car	1887	..	14·0	220	..

(*a*) To be used as a Transport.

SPAIN.—Unarmoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
cr.	Don Antonio Ulloa	1130	210 0	32 0	12 6	1	1600	iron	4 12-c.m. (Hontoria), 2 7-c.m. do., 5 Q.F., 2 M.	2 f. tu. or l.car	1887	..	14·00	220	..
„	Don Juan de Austria	1130	210 0	32 0	12 6	1	1600	„	4 12-c.m. (Hontoria), 3 57-m.m. Q.F., 2 4·2-c.m. do., 1 3-pdr. do., 1 M.	3 f. tu. or l.car	1887	..	14·00	..	..
to.g.b.	Destructor	458	192 6	25 0	mean dt. 7 0	2	3800	steel	1 9-c.m., 4 6-pr. Q.F., 4 M.	3 f. tu. or l.car	1887	..	22·56	..	5500
g.v.	El Cano	524	157 5	25 7	8 6	2	600	iron	3 12-c.m. (Hontoria), 8 Q.F., 2 M.	1 l. car	1885	..	11·50	80	..
cr.	Ensenada . pp. 2½"–1"	1030	185 0	30 0	11 6	2	1600	steel	4 12-c.m. (Hontoria), 5 Q.F., 4 M.	3 f. tu. 1 l. car	1890	..	15·00	..	..
d.v.	Fernando el Catolico	500	157 5	25 7	8 5	2	550	iron	1 16-c.m. M.L.R. (Palliser), 2 12-c.m. smooth-bores, 1 M.	..	1875	..	10·00	20	..
to.g.b.	Filipinas*	750	233 0	27 0	8 0	2	4600	steel	2 12-c.m. Q.F., 4 42-m.m. do., 2 M.	4 f. tu. or l.car	1892	..	20·00	..	2600
„	Galicia	570	190 0	23 0	10 4	2	2600	„	2 12-c.m. (Hontoria), 4 57-m.m. Q.F., 1 M.	2 l. car.	1891	..	19·00	106	..
g.v.	General Lezo	524	157 5	25 7	8 6	2	600	iron	2 12-c.m. (Hontoria), 1 9-c.m. do., 2 Q.F., 1 M.	1 l. car	1885	..	11·00	80	..
cr.	Infanta Isabel	1130	210 11	32 2	12 5	1	1500	„	4 12-c.m. (Hontoria), 2 7-c.m. do., 3 Q.F., 4 M.	2 l. car	1885	..	14·00	220	..
„	Isabel II.	1130	210 11	32 2	12 5	1	1500	„	4 12-c.m. (Hontoria), 2 7-c.m. do., 4 Q.F., 3 M.	2 l. car	1886	..	14·00	220	..
cr.	Isla de Cuba . pp. 2½"–1"	1030	185 0	30 0	11 6	2	2200	steel	4 12-c.m. (Hontoria), 4 6-pdr. Q.F., 2 3-pdr. do., 2 M.	3 f. tu. or l.car	1887	..	16·00	160	..
„	Isla de Luzon . pp. 2½"–1"	1030	185 0	30 0	11 6	2	2200	„	4 12-c.m. (Hontoria), 4 6-pdr. Q.F., 2 3-pdr. do., 1 M.	3 f. tu. or l.car	1887	..	16·00	160	..
sl.	Jorge Juan	935	203 5	29 6	12 2	1	1100	wood	3 16-c.m. 6-ton M.L.R. (Palliser), 2 73-m.m. (Krupp), 2 M.	..	1876	..	13·00	130	..
cr.	Lepanto . P. 4¾"–3"	4826	318 6	50 6	20 0	2	12,000	steel	4 20-c.m. (Hontoria), 6 12-c.m. Q.F., 6 6-pdr. do., 4 3-pdr. do., 5 M.	5 f. tu. or l.car	1892	..	20·00	1100	..
g.v.	Magellanes	524	157 5	25 7	8 6	2	600	iron	3 12-c.m. (Hontoria), 3 M.	1 l. car	1885	..	11·0	80	..
d.v.	Marques del Duero	500	157 5	25 7	8 5	2	550	„	1 16-c.m. M.L.R. (Palliser), 2 12-c.m. smooth-bores, 1 M.	..	1875	..	10·0	90	..
to.g.b.	Marques de Molins	571	190 0	23 0	10 4	2	2600	steel	2 12-c.m. (Hontoria), 4 57-m.m. Q.F., 1 M.	2 l. car	1891	..	19·0	106	..
„	Martin Alonzo Pinzon	571	190 0	23 0	10 4	2	2600	„	2 12-c.m. (Hontoria), 4 57-m.m. Q.F., 1 M.	2 l. car	1892	..	19·0	106	..
cr.	Navarra	3342	232 11	42 7	20 4	1	4400	wood	4 15-c.m. 2 12-c.m., 2 87-m.m., 4 75-m.m., 4 M.	2 l. car	1881	..	14·0	470	..
to.g.b.	New (B, C, D) (*a*)	850	..	..	..	2	4500	steel	2 12-c.m. Q.F., 4 42-m.m. Q.F., 2 M.	4 f. tu. or l.car	Bldg.	100,840 each	20·0	..	2600
„	Nueva Espana	630	190 0	23 0	10 4	2	2600	„	2 12-c.m. (Hontoria), 4 57-m.m. Q.F., 1 M.	2 l. car.	1889	..	18·0	106	..
g.v.	Prosperidad	420	141 0	22 7	9 7	1	134	wood	2 12-c.m. (Hontoria), 1 75 m.m., 1 M.	..	1865	..	6·0	80	..
to.g.b.	Rapido	570	190 0	23 0	10 4	2	2600	steel	2 12-c.m. (Hontoria), 4 57-m.m. Q.F., 1 M.	2 l. car.	1891	..	18·0	106	..
cr.	Reina Christina (*b*)	3520	282 2	42 7	16 5	1	3970	„	6 16-c.m. (Hontoria), 2 7-c.m. do., 3 57-m.m. Q.F., 2 42-m.m. do., 6 3-pdr. do., 2 M.	5 f. tu. or l.car	1886	..	17·5	600	..
„	Reina Mercedes (*c*)	3090	278 10	42 7	16 5	1	3700	„	6 16-c.m. (Hontoria), 2 7-c.m. do., 3 57 m.m. Q.F., 2 42-m.m. do. 6 37-m.m. do., 2 M.	5 f. tu. or l.car	1887	..	17·5	600	..
„	Reina Regente . P. 6"–3"	5000	318 6	50 6	20 0	2	11,000	„	4 20-c.m. (Hontoria), 6 12-c.m. do., 6 6-pdr. Q.F., 4 3-pdr. do., 5 M.	5 f. tu. or l.car	1887	..	20·7	1100	..
sl.	Sanchez Barcaistegui	935	203 5	29 6	12 2	1	1100	wood	3 16-c.m., M.L.R. (Palliser), 2 75-m.m. (Krupp), 2 M.	..	1876	..	13·0	130	..
to.g.b.	Temerario	570	190 0	23 0	10 4	2	2600	steel	2 12-c.m. (Hontoria), 4 42-m.m. Q.F., 1 M.	2 l. car	1889	..	20·5	106	..
cr.	Velasco	1152	209 11	29 3	12 5	1	1500	iron	3 15-c.m. 4-ton (Armstrong), 2 7-c.m. (Hontoria), 2 M.	..	1881	..	14·3	220	..
to.g.b.	Veloz	750	190 0	23 0	10 4	2	4500	steel	2 12-c.m. (Hontoria), 4 57-m.m. Q.F., 1 M.	2 l. car.	Bldg.	..	20·0	106	..
„	Vincente Yanez Pinzon	571	190 0	23 0	10 4	2	2600	„	2 12-c.m. (Hontoria), 4 57-m.m. Q.F., 1 M.	..	..	..	19·0	106	..

(*a*) Armoured Conning Tower 9¼ inches thick. (*b*) To be used as a Transport. (*c*) To be used as a Cavalry Transport.

Seven gunboats of from 216 to 245 tons, and from 185 to 345 I.H.P.
Small steamers, classed as third-class gunboats, &c., forty in number, 86 to 348 tons.

SWEDEN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Turret.	Armour. Belt.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
a.g.b.	Berserk . (iron)	452	131 3	29 6	8 3	2	155	14	2½	34 ¾″	1 24-c.m. 15-ton, 2 M.. . .	..	1874	..	8·0	19	..
,,	Björn . (iron)	457	131 3	26 3	8 3	2	155	14	2½	34 ¾″	1 24-c.m. 15-ton, 2 M. . . .	..	1874	..	8·0	19	..
,,	Fenris . (iron)	259	104 11	22 4	7 10	1	44	11	2	34 ¾″	1 24-c.m. 15-ton, 2 M. . . .	..	1872	..	6·0	7	..
,,	Folke . (iron)	460	131 3	26 3	8 3	2	155	14	2½	34 ¾″	1 24-c.m. 15-ton, 2 M. . . .	..	1875	..	8·0	19	..
,,	Gerda . (iron)	457	131 3	26 3	8 3	2	133	14	2½	34 ¾″	1 24-c.m. 15-ton, 2 M. . . .	..	1873	..	8·0	19	..
c.d.s.,t	Göta . (steel)	3135	258 6	48 0	16 0	2	4677	11½–9¾ 10½C.T.	11½	.. 2″	2 10-in. 4 6-in., 5 Q.F. do., 6 M. .	3 f. tu. orl.car.	1890	..	15·96	200	..
,,	Hildur . (iron)	457	131 3	26 3	8 3	2	133	14	2½	34 ¾″	1 24-c.m. 15-ton, 2 M. . . .	..	1872	..	8·0	19	..
c.d.s.,t.	John Ericsson (iron)	1500	200 2	45 11	11 6	1	380	11½ 9¾ C.T.	4½	31½ 1″	2 24-c.m. 15-ton, 2 M. . . .	..	1865	..	6·0	112	..
,,	Loke . (iron)	1600	205 3	45 11	11 10	1	430	18 9¾ C.T.	4½	40 1″	2 24-c.m. 15-ton, 2 M. . . .	..	1871	..	7·0	112	..
a.g.b.	Sköld . (iron)	247	104 11	22 4	8 3	1	17	9	1	34 ¾″	1 24-c.m. 15-ton, 2 M. . . .	..	1869	..	4·0	5	..
,,	Sölve . (iron)	454	131 3	29 6	8 3	2	155	14	2½	34 ¾″	1 24-c.m. 15-ton, 2 M. . . .	..	1875	..	8·0	19	..
c.d.s.,t.	Svea . (steel)	2900	249 4	49 3	15 9	2	3100	11½ 10½C.T.	11½	.. 2″	2 10-in. 27-ton (Armstrong), 4 6-in. 4-ton do., 4 Q.F., 6 M.	3 f. tu. orl.car.	1886	127,300	15·45	200	800 at 12 knots.
,,	New ship . (steel)	3400	..	..	..	..	..	..	..	..	2 25-c.m. 4 12-c.m. Q.F. . .	3 f. tu. orl.car.	Bldg.	..	16·0	..	..
t.	Thordön . (iron)	1500	200 2	45 11	11 6	1	380	11½ 9¾ C.T.	4½	26 1″	2 24-c.m. 15-ton, 2 M. . . .	..	1866	..	6·0	112	..
c.d.s.,t.	Thule . (steel)	3135	249 4	49 3	15 9	2	3150	11½ 10½C.T.	11½–7¾	22 2″	2 10-in. (Armstrong) 4 6-in. do., 5 Q.F., 6 M.	3 f. tu. orl.car.	1892	..	16·0	..	..
,,	Tirfing . (iron)	1500	200 2	45 11	11 6	1	380	11½ 9¾ C.T.	4½	26 1″	2 24-c.m. 15-ton, 2 M. . . .	..	1867	..	6·0	112	..
a.g.b.	Ulf . . (iron)	457	131 3	26 3	8 3	2	155	14	2½	34 ¾″	1 24-c.m. 15-ton, 2 M. . . .	..	1873	18,000	8·0	20	..

SWEDEN.—Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
corv.	Balder	1886	203 5	36 0	18 4	1	1380	wood	2 15-c.m. (Armstrong), 6 12-c.m., 2 Q.F., 4 M.	..	1870	..	12·0	200	940
g.v.	Blenda	500	167 4	25 11	9 2	2	590	iron	1 27-c.m., 1 12-c.m., 2 M.	..	1875	..	12·0	98	..
„	Disa	500	167 4	25 11	9 2	2	590	„	1 27-c.m., 1 12-c.m., 2 M.	..	1877	..	12·0	98	..
tor. ship.	Drott	630	173 10	26 3	9 6	2	960	„	4 Engström, Q.F.	3 f. tu. or 1.car	1877	..	13·0	100	1000
g.v.	Edda	640	180 5	27 3	9 6	2	960	„	1 27-c.m., 1 15-c.m., 2 Q.F., 2 M.	..	1882	..	13·0	80	..
corv.	Freja	2000	216 6	39 4	18 9	1	1750	steel&wood	4 15-c.m. 4-ton, 8 12-c.m., 4 Q.F., 4 M.	..	1885	..	12·0	180	..
g.v.	Rota	537	170 7	26 3	9 2	2	780	iron	1 27-c.m. 24-ton, 1 12-c.m., 2 M.	..	1878	..	13·0	80	..
corv.	Saga	1535	200 2	32 10	17 1	1	900	wood	1 15-c.m. 5-ton (Armstrong), 6 12-c.m., 4 M., 2 l.	..	1878	..	11·0	170	..
g.v.	Skäggald	537	170 7	26 3	9 2	2	780	iron	1 27-c.m. 24-ton, 1 12-c.m., 2 M.	..	1879	..	13·0	80	..
„	Skagul	537	170 7	26 3	9 2	2	780	„	1 27-c.m. 24-ton, 1 12-c.m., 2 M.	..	1878	..	13·0	80	..
„	Skuld	537	170 7	26 3	9 2	2	780	„	1 27-c.m. 24-ton, 1 12-c.m., 2 M.	..	1880	..	13·0	80	..
„	Urd	537	170 7	26 3	9 2	2	780	„	1 27-c.m. 24-ton, 1 12-c.m., 2 M.	..	1877	..	13·0	80	..
cr.	Vanadis	2136	209 11	42 7	20 1	1	1400	wood	10 12-c.m., 2 Q.F., 4 M.	..	1862	..	11·0	235	..
g.v.	Verdande	537	170 7	26 3	9 2	2	780	iron	1 27-c.m. 24-ton, 1 12-c.m., 2 M.	..	1879	..	13·0	80	..

Four gunboats of 190 to 200 tons, and about 130 I.H.P. each, and carrying 1 12-c.m. B.L.R. and 2 M.; also one gunboat of 280 tons and 440 H.P., armed with 4 quick-firing guns. Torpedo School-vessel Ran, built of steel and of 175 tons displacement, 140 I.H.P. and 10 knots speed. Two torpedo gunboats, Goudul and Gudur, building.

TURKEY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.		Beam.		Draught of Water.		Propellers.	Indicated Horse-power.	Armour. Turret or Battery.	Armour. Belt.	Backing.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply	Distance that can be steamed at 10 knots.
		tons.	ft.	in.	ft.	in.	ft.	in.			inches.	inches.	inches.				£	knots.	tons.	knots.
a.c.	Abdel-kader . . .	8000	341	0	65	6	..		..	12,000	..	14	2	4 28-c.m. (Krupp), 6 15-c.m. do., 10 Q.F.	10 f. tu or l. car	Bldg.	..	..	..	..
c.b.	Assar-i-Schefket .(iron)	2080	203	5	42	7	16	5	2	1750	4½	6	9	1 9-in. (Armstrong), 4 7-in. do., 4 M., 4 l.	..	1868	..	11·0	300	..
"	Assar-i-Tevfik .(iron)	4687	272	4	52	6	24	11	1	3560	6	8	9	8 24-c.m. (Krupp), 2 21-c.m. do. 7 M. 4 l.	..	1868	..	13·0	400	..
"	Avni-Illah . . .(iron)	2400	226	4	36	0	16	5	1	2200	5	6	10	4 9-in. 12-ton M.L.R. (Armstrong), 4 l., 4 M.	1 l. car.	1869	..	12·0	220	..
b.	Azizieh (*a*) . .(iron)	6400	292	0	55	9	25	7	1	3735	5	5¼	9	2 28-c.m. (Krupp), 8 15-c.m. do., 6 10-c.m. do., 7 M., 2 l.	2 l. car.	1864	..	13·0	750	..
c.b.	Feth-i-Bulend . .(iron)	2806	236	3	39	4	18	1	1	3250	6	9	10	4 9-in. 12-ton M.L.R. (Armstrong), 2 l., 4 M.	1 l. car.	1869	..	13·0	300	..
a.g.b.	Feth-el-Islam . .(iron)	335	101	9	24	7	5	11	1	290	3	3	10	2 7-in. (Armstrong), 2 l.	..	1864	..	8·0	20	..
c.b.	Hamidieh . . .(iron)	6700	292	0	55	9	24	10	1	4500	5	9	18	10 26-c.m. (Krupp), 2 17 c.m. do., 6 Q.F., 2 M.	2 l. car.	1885	..	13·0	600	..
a.g.b.	Hisber . . (iron)	404	144	4	30	10	5	7	1	400	3	3	5½	2 15-c.m. (Krupp), 2 l., 2 M. . . .	..	1875	..	7·0	20	..
t.	Hufzi-el-Rahman .(iron)	2540	204	0	45	11	14	5	1	200 nom.	5	4½	10	2 12-ton M.L.R. (Armstrong), 2 6½-ton do., 1 5-in. (Krupp), 6 M. . .	..	1868	..	12·0	200	..
c.b.	Idjilalieh . . .(iron)	2266	213	3	42	7	17	4	1	1800	4·5	6	13	2 12½-ton M.L.R. (Armstrong), 2 6½-ton do., 1 15-c.m. (Krupp), 4 M.	..	1870	..	11·0	300	..
b.	Mahmudieh (*a*) . .(iron)	6400	292	0	55	9	25	7	1	3735	5	5¼	9	2 28-c.m. (Krupp), 8 15-c.m. do., 6 10-c.m. do., 7 M., 2 l.	2 l. car.	1864	..	12·0	750	..
a.g.b.	Memdooyeh	335	101	9	24	7	5	11	1	290	3	3	10	2 7-in. (Armstrong), 2 l.	..	1864	..	8·0	20	..
c.b.	Mesoodieh . . .(iron)	9120	331	5	59	0	25	11	1	7431	10 1″	12	10	12 18-ton M.L.R. (Armstrong), 3 15-c.m. (Krupp), 7 M., 6 l.	..	1874	..	13·0	600	..
"	Muin-i-Zaffer . .(iron)	2400	230	0	36	0	16	5	2	2200	5	6	10	4 12-ton M.L.R. (Armstrong), 1 12-c.m. K., 2 l., 4 M.	..	1869	..	12·0	220	..
"	Mukadim-i-Hair .(iron)	2806	236	3	39	4	18	1	1	3000	6	9	10	4 12-ton M.L.R. (Armstrong), 1 12-c.m. (Krupp), 2 l., 4 M.	..	1872	..	12·0	300	..
"	Nedjim-i-Schefket .(iron)	2080	203	5	42	7	16	5	2	1900	4¼	6	9	1 9-in., 4 7-in. (Armstrong), 4 M., 4 l. .	..	1868	..	11·0	300	..
b.	Orkanieh (*a*) .(iron)	6400	292	0	55	9	25	7	1	3735	5	5¼	9	2 28-c.m. (Krupp), 8 15-c.m. do, 6 10-c.m. do., 7 M., 2 l.	2 l. car.	1865	..	12·0	750	..
"	Osmanieh (*a*) . .(iron)	6400	292	0	55	9	25	7	1	3735	5	5¼	9	2 28-c.m. (Krupp), 8 15-c.m. do., 6 10-c.m. do., 7 M., 2 l.	2 l. car.	1864	..	12·0	750	..

(*a*) These ships are converted or are being converted. They are cut down forward and aft, and a barbette fitted at each end with one 28-c.m. B.L. (Krupp) in each.

TURKEY.—Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
g.v.	Beyruth	609	173 6	26 7	12 10	1	160	..	2 12-c.m. (Krupp), 2 M., 2 l.	..	1863–89	..	10·0	120	..
sl.	Brussa	800	172 6	30 6	15 2	1	150	wood	2 6-in. (Krupp), 2 12-c.m. do., 2 M.	..	1859–87	..	11·0	120	..
to.g.b.	Edschder	..	154 0	18 4	7 3	2	2500	steel	5 47-m.m. Q.F. . .	2 l. car.	1890	..	24·0	..	..
"	New (N.)	..	187 0	18 4	..	2	..	"	6 3·7-c.m. Q.F. . .	2 l. car.	Bldng.	..	20·0	..	..
sl.	Edirneh	782	172 6	30 6	14 2	1	150	wood	2 6-in. (Krupp), 2 12-c.m. do., 2 M.	..	1859–87	..	11·0	120	..
cr.	Fezibahri	1815	226 0	35 0	14 0	2	2500	steel	6 15-c.m. (Krupp) .	7 f. tu. or l. car	Bldng.	..	17·0	..	..
"	Heibetnuma	1960	226 0	37 0	14 0	1	2500 ind.	steel & wood	3 17-c.m. (Krupp), 6 12-c.m. do., 6 Q. F.	2 l. car.	1890	..	14·0	..	..
"	Hudavendikiar . . P.	4050	279 0	49 3	21 0	2	..	steel	2 21-c.m. (Krupp), 6 15-c.m. do., 4 $10\frac{1}{2}$-c.m. do.	5 f. tu. or l. car	Bldng.	..	..	..	..
gv.	Iskenderieh	609	173 6	26 7	12 10	1	160	wood	2 12-c.m. (Krupp), 2 M., 4 l.	..	1863–85	..	11·0	120	..
"	Lutfi-hamayoun . . .	1313	210 0	35 0	14 0	1	2800	composite	4 6-in. (Krupp), 6 4·7-in. do., 6 Q. F.	2 l. car.	1892	..	13·0	..	..
sl.	Mansureh	800	174 10	30 6	15 2	1	150	wood	2 6-in. (Krupp), 2 12-c.m. do., 2 M.	1 l. car.	1863–88	..	11·0	120	..
corv.	Mehemet Selim . . .	1300	196 10	32 10	16 6	1	450	"	10 15-c.m. (Krupp), 4 M., 4. l.	1 l. car.	1875	..	11·0	250	..
g.v	Mehrieh	609	173 6	26 7	12 10	1	160	"	2 $4\frac{3}{4}$-in. (Krupp) 2 M., 4 l.	..	1863	..	10·0	120	..
cr.	Mookbir-i-Sooroor (T. Sch.)	1477	209 11	38 0	17 5	1	450	..	22 guns	..	1879	..	..	..	..
gv	Two new vessels . . .	800	180 0	24 0	..	2	..	steel	2 6-in., 6 4·7-in., Q.F. .	4 f. tu. or l. car	Bldng.	..	12·0	..	..

Turkey.—Unarmoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
sl.	**Muzafer**	800	174 10	30 6	15 2	1	150	wood	2 6-in. 5-ton (Krupp), 2 12-c.m. do., 2 M.	1 l. car.	1863–88	..	12·0	150	..
to.g.b.	**Namet**	900	230 0	31 0	16 6	..	4500	steel	2 $10\frac{1}{2}$-c.m. (Krupp), 6 $8\frac{1}{2}$-c.m. do.	4 f. tu. or l. car	1890	..	19·0	..	..
g.v.	**Sedul Bahr** . . .	609	173 6	26 7	12 10	1	160	wood	4 $4\frac{3}{4}$-in. (Krupp), 6 M. .	..	1859–85	..	10·0	120	..
cr.	**Selimieh** . . . . P.	4050	279 0	49 3	21 0	2	..	steel	2 21-c.m. (Krupp), 6 15-c.m. do., 4 $10\frac{1}{2}$-c.m. do.	..	Bldng.	..	..	..	..
cr.	**Shadie**	1815	226 0	35 0	14 0	2	2500	„	6 15-c.m. (Krupp). .	7 f. tu. or l. car	Bldng.	..	17·0	..	..
to.g.b.	**Shahani-deria** . . .	450	200 0	23 0	9 0	2	3000	„	2 4-in. Q.F. (Krupp), 6 47-m.m. do.	4 l. car.	1892	..	22·0	..	..
to.g.b.	New vessels (X) and (Y) .	..	230 0	..	..	2	..	..	6 57-m.m. Q.F. . . .	4 f.u. or l. car	Bldng.	..	19·0	..	..
sl.	**Sinope**	800	174 10	30 6	15 2	1	150	wood	2 6-in. (Krupp), 2 12-c.m. do., 2 M.	..	1859–89	..	10·0	..	..
g.v.	**Uthared**	609	173 6	26 7	12 10	1	160	„	2 $4\frac{3}{4}$-in. (Krupp), 2 M, 4 l.	..	1863–85	..	10·0	120	..
„	**Zuhaf**	609	173 6	26 7	12 10	1	160	„	4 $4\frac{3}{4}$-in. (Krupp), 6 M. .	..	1862–85	..	10·0	120	..

Twenty-seven Despatch vessels and yachts, of 194 tons to 1512 tons displacement, and 50 h.p. to 800 h.p. About one-half of these vessels are built of wood.

Five Gunboats, of 200 tons displacement and 60 h.p., and about 10 knots speed. Six gunboats, 120 feet in length, of 200 tons displacement and carrying 4 guns, are now building.

UNITED STATES.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Turret or Battery.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches	inches.	inches				£	knots.	tons.	knots.
c.d.s., t.	Ajax (1 turret) (iron)	2100	226 4	43 7	13 9	1	340	5	11	..	2 15-in. smooth-bores, 2 l.	..	1864	125,000	6·0	160	..
to. ram	Alarm . (iron)	720	172 6	29 3	11 2	1	800	4 (on traverse)	..	16	1 6-in., 2 Q.F., 1 M.	..	1873	..	11·0	..	..
c.d.s., t.	Amphitrite (2 t.) . (iron)	3990	249 4	55 9	14 3	2	1600	9 C. T. 7½	11½	.. 2"	4 10-in., 2 6-pdr. Q.F., 2 3-pdr. do., 2 1-pdr. do., 2 M.	..	1883	..	12·0	300	1800
a.c.b.	Brooklyn . (steel)	9250	400 6	64 0	24 0	2	16,000	3	8–5 C.T. 7½	.. 6"–3"	8 8-in., 12 5-in. Q.F., 12 6-pdr. do., 4 1-pr. do., 4 M., 2 l.	6 f. tu. or l.car	Bldng.	700,000	21·0	1650	6216
c.d.s., t.	Camanche (1 t.) (iron)	1875	200 2	45 11	11 6	1	350	5	10	..	2 15-in. 19-ton smooth-bores	..	1863	125,000	6·0	160	..
c.d.s., t.	Canonicus (1 t.) (iron)	2100	226 4	43 7	13 9	1	320	5	10	..	2 15-in. 19-ton smooth-bores	..	1864	125,000	6·0	160	..
c.d.s., t.	Catskill (1 t.) (iron)	1875	200 2	45 11	11 6	1	350	5	10	..	2 15-in. 19-ton smooth-bores.	..	1863	..	6·0	150	..
c.l.b., t.	Indiana . (steel)	10,231	348 0	69 3	24 0	2	9000	18 C. T. 10	17 6 to 8 in. small turrets	6 3"	4 13-in., 8 8-in., 6 4-in. Q.F., 20 6-pdr. do., 4 1-pdr. do., and 4 M.	6 f. tu. or l.car	1893	604,000	16·0	400 1800	3600 16,000
c.l.b., t.	Iowa . . .	11,286	360 0	72 0	24 0	..	11,000	14	15 5 Top-sides.	.. 3–2½	4 12-in. 45-ton, 8 8-in., 6 4-in. Q.F., 20 6-pr. do., 6 1-pr. do., 2 M.	6 f. tu. or l.car	Bldng.	900,000	16·5	2000	6000
c.d.s., t.	Jason (1 t.) (iron)	1875	200 2	45 11	11 6	1	350	5	11	..	2 15-in. 19-ton smooth-bores.	..	1864	..	6·0	150	..
c.d.s.ram	Katahdin . (steel) (was Ammen)	2050	243 0	43 6	15 0	2	4800	6	.. 18 C.T.	.. 6"–3"	4 6-pdr. Q.F.	Nil	1893	186,000	17·0	..	..
c.d s., t.	Lehigh (1 t.) (iron)	1875	200 2	45 11	11 6	1	350	5	11	..	2 15-in. 19-ton smooth-bores.	..	1864	..	6·0	150	..
c.d.s., t.	Mahopac (1 t.) (iron)	2100	226 4	43 7	13 9	1	320	5	10	..	2 15-in. 19-ton smooth-bores.	..	1865	..	6·0	160	..

UNITED STATES.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse-power.	Armour. Belt.	Armour. Turret or Battery.	Backing. Deck Plating.	Armament. Guns.	Armament. Fish Torpedo Dischargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.			inches.	inches.	inches.				£	knots.	tons.	knots.
a.c., t.	Maine (2 t.) (steel)	6682	310 0	57 0	21 6	2	9000	12	12 C. T. 10	.. 4″–2″	4 10-in. 26-ton, 6 6-in., 8 6-pdr. Q.F., 8 1-pdr. do., 4 M.	7 f. tu. or l.car	1890	517,600	17·0	822	7000
c.d.s., t.	Manhattan (1 t.) (iron)	2100	226 4	43 7	13 9	1	320	5	10	..	2 15-in. 19-ton smooth-bores	..	1865	..	6 0	160	..
c.l.b., t.	Massachusetts (steel)	10,231	348 0	69 3	24 0	2	9000	18 C. T. 10	17 8 to 6 small T.	6″ 3″	4 13-in., 8 8-in., 4 6-in., 20 6-pdr. Q.F., 4 1-pdr. do., 4 M.	6 f. tu. or l.car	1893	604,000	16·25	400 1800	3600 16,000
c.d.s., t.	Miantonomoh (2 t.) (iron)	3990	249 4	55 9	14 3	2	1600	7	11½	8 2″	4 10-in. 2 6-pdr. Q.F., 2 3-pdr. do., 2 1-pdr. do., 2 M.	..	1876 (rebuilt)	272,000	10·5	330	1800
c.d.s., t.	Monadnock (2 t.) (iron)	3990	249 4	55 9	14 3	2	1600	9	11½	8 2″	4 10-in. 2 6-pdr. Q.F., 2 3-pdr. do., 2 1-pdr. do., 2 M.	..	1883 (rebuilt)	272,000	12·0	330	1800
c.d.s., t.	Montauk (1 t.) (iron)	1875	200 2	45 11	11 6	1	350	5	11	..	2 15-in. 19-ton smooth-bores .	..	1864	..	5·5	160	..
e.d.s., b.	Monterey (steel) .	4138	256 0	59 0	14 9	2	5072	13	14 10 C. T.	.. 3″–2″	2 12-in. 45-ton, 2 10-in., 4 6-pdr. Q.F., 4 1-pdr. do., 2 M.	..	1891	..	14 4	200	..
c.d.s., t.	Nahant (1 t.) (iron)	1875	200 2	45 11	11 6	1	350	5	11	..	2 15-in. 19-ton smooth-bores .	..	1863	..	6·0	160	..
c.d.s., t.	Nantucket (1 t.) (iron)	1875	200 2	45 11	11 6	1	350	5	11	..	2 15-in. 19-ton smooth-bores .	..	1863	..	5·6	160	..
a.c.	New York (steel)	8500	380 6	64 10	23 3½	2	16,500	4 in way of machinery.	10 C.T. 7	.. 6″–3″	6 8-in., 12 4-in. Q.F., 8 6-pdr. do., 4 1-pdr. 4 M.	6 f. tu. or l.car	1891	597,000	21·0	750 1150	13,500
c.l.b., t.	Oregon . (steel)	10,231	348 0	69 3	24 0	2	9000	18 C. T. 10	17 8 to 6 small T.	.. 3″	4 13-in., 8 8-in., 4 6-in., 20 6-pdr. Q.F., 4 1-pdr. do., 4 M.	7 f. tu. or l.car	1893	636,000	16·0	400 1800	3600 16,000
c.d.s., t.	Passaic (1 t.) (iron)	1875	200 2	45 11	11 6	1	350	5	11	..	2 15-in. 19-ton smooth-bores .	..	1863	..	6·0	160	..
c.d.s., t.	Puritan (2 t.) (iron)	6060	280 0	60 1½	18 1	2	3700	12	11½	.. 2″	4 12-in., 6 4-in. Q.F., 2 6-pdr. do., 4 3-pdr. do., 4 1-pdr. do., 4 M	..	1884 (rebuilt)	..	13·0	580	..
c.d.s., t.	Terror (2 t.) (iron)	3990	249 4	55 9	14 3	2	1600	7	11½	8 1½″	4 10-in., 2 6-pdr. Q.F., 2 3-pdr. do., 2 1-pdr. do., 2 M.	..	1883 (rebuilt)	206,800	12·0	330	1800
t.	Texas (2 t.) (steel)	6300	290 0	64 7	22 6	2	8600	12	12	.. 3″	2 12-in. 46-ton, 6 6-in. do., 12 6-pdr. Q.F., 4 1-pdr. do., 4 M.	6 f. tu. or l car	1892	495,000	17·0	850	7000
c.d.s., t.	Wyandotte (1 t.) (iron)	2100	225 0	43 7	13 6	1	320	5	10	..	2 15-in. 19-ton smooth-bores	..	1864	..	6·0	160	..

UNITED STATES.—Unarmoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
cr.	Adams . . .	1375	183 9	35 0	14 2	1	550	wood	1 8-in. 8-ton M.L.R., 4 9-in. smooth-bore, 1 60-pdr., 2 l., 3 M.	..	1874	..	9·8	150	..
g.v.	Alert	1020	173 10	31 10	12 10	1	656	iron	1 8-in. 8-ton M.L.R., 4 9-in. smooth-bore, 1 60-pdr., 2 l.	..	1874	..	9·0	140	..
sl.	Alliance . . .	1375	183 9	36 0	14 2	1	774	wood	1 8-in. 8-ton M.L.R., 4 9-in. smooth-bore. 1 60-pdr., 2 l., 1 M.	..	1875	..	9·0	130	..
cr.	Atlanta . . . . *p.p.* 1½"	3189	270 0	42 0	18 0	1	3511	steel	2 8-in. 11¾-ton, 6 6-in. 5-ton, 6 Q.F., 6 M. .	..	1884	123,600	16·33	490	4000
„	Baltimore . P. 4"–2½"	4600	315 0	48 6	20 6	2	10750	„	4 8-in., 6 6-in., 4 6-pdr. Q.F., 2 3-pdr. do., 2 1-pdr. do., 6 M.	5 f. tu. or l.car	1888	210,000	20·6	1140	6800
..	Bancroft	838	180 0	32 0	11 6	2	1213	..	4 4-in. Q.F., 2 6-pdr. do., 2 3-pdr. do., 1 1-pdr. do., 2 M.	2 f. tu. or l.car	1892	..	14·37	200	4200
cr.	Bennington . .	1750	230 0	36 0	14 0	2	3533	steel	6 6-in. 2 6-pdr. Q.F., 2 3-pdr. do., 2 1-pdr. do., 4 M.	2 l. car	1890	98,000	17·5	400	6500
„	Boston . . *p.p.* 1½"	3189	270 0	42 0	18 0	1	3780	„	2 8-in. 11¾-ton, 6 6-in. 5-ton, 6 Q.F., 6 M. .	..	1884	123,200	15·0	490	4000
g.v.	Castine . . .	1050	184 4	32 0	12 2	2	1600	„	8 4-in. Q.F., 4 6-pdr. do., 2 1-pdr. do., 2 M.	..	1892	..	16·2	250	5000
cr.	Charleston . P. ¾"	4040	300 0	46 2	19 6	2	7500	„	2 8-in., 6 6-in., 4 6-pdr. Q.F., 2 3-pdr. do., 2 1-pdr. do., 6 M.	4 f. tu. or l.car	1888	..	18·7	800	5200
„	Chicago . . *p.p.* 1½"	4500	315 0	48 2	19 0	2	5248	„	4 8-in., 8 6-in., 2 5-in., 4 Q.F., 8 M. . .	..	1885	177,800	16·3	940	5000
„	Cincinnati . P. 2½"	3183	291 3	42 0	18 0	2	10,000	„	1 6-in., 10 5-in. Q.F., 8 6-pdr. do., 4 1-pdr. do., 2 M.	6 f. tu. or l.car	1892	220,000	19·0	556	4500
„	Columbia (was Cr. No. 12) P. 4"–2½"	7475	412 0	58 2	22 6½	3	21,500	„	1 8-in. 2 6-in., 8 4-in. F., 12 6-pdr. do., 4 1-pdr. do., 4 M.	6 f. tu. or l.car	1892	545,000	22·8	2400	13,000

UNITED STATES.—Unarmoured Ships—*continued*.

Class.	NAME.	Displacement.	Length.	Beam.	Mean Draught of Water.	Propellers.	Indicated Horse-power.	Material of Hull.	Armament. Guns.	Armament. Fish Torpedo Dis-chargers	Date of Launch.	Cost.	Speed.	Coal Supply.	Distance that can be steamed at 10 knots.
		tons.	ft. in.	ft. in.	ft. in.							£	knots.	tons.	knots.
cr.	Concord	1700	230 0	36 0	14 0	2	3513	steel	6 6-in., 2 6-pdr. Q.F., 2 3-pdr. do., 2 1-pdr. do., 4 M.	2 l. car	1890	98,000	17·3	400	6500
,,	Detroit	2000	257 0	37 0	14 6	2	5400	,,	2 6-in., 8 5-in. Q.F., 6 6-pdr. do., 2 1-pdr. do., 2 M.	6 f. tu. or l.car	1892	..	18·71	435	6000
,,	Dolphin	1485	239 6	31 10	14 2	1	2300	,,	2 4-in. Q.F., 2 6-pdr. do., 6 M.	..	1884	61,000	15·5	310	..
,,	Essex. (Fitting for a gunnery ship)	1375	183 9	36 0	14 2	1	800	wood	(*a*) 1 8-in. 8-ton smooth-bore, 4 9-in. 4-ton do., 1 60-pdr., 2 l., 2 M.	..	1874	..	10·0	140	..
cr.	Lancaster	3250	236 3	45 11	19 1	1	750	,,	10 8-in. M.L.R., 2 6-pdr. Q.F., 2 1-pdr. do., 5 M., 1 l.	..	1859	..	9·6	288	..
g.v.	Machias	1050	184 4	32 0	12 2	2	1600	steel	8 4-in. Q.F., 4 6-pdr. do., 2 1-pdr. do., 2 M.	..	1892	..	15·46	250	5000
cr.	Marblehead	2000	257 0	37 0	14 6	2	5400	,,	2 6-in., 8 5-in. Q.F., 6 6-pdr. do., 2 1-pdr. do., 2 M.	6 f. tu. or l.car	1892	122,500	18·94	435	6000
corv.	Marion	1900	216 6	37 0	16 5	1	1172	,,	6 9-in. 4-ton smooth-bores, 1 8-in. 8-ton M.L.R., 1 60-pdr., 3 l., 3 M.	..	1873	..	11·0	156	..
cr.	Minneapolis (was Cr. No. 13) P. 4″–2½″	7475	412 0	58 2	22 6½	3	21,000	,,	1 8-in., 2 6-in. Q.F., 8 4-in. do., 12 6-pdr. do., 4 1-pdr. do., 4 M.	6 f. tu. or l.car	1893	538,000	22·0	2400*	13,000
corv.	Mohican	1900	216 6	37 0	16 5	1	1172	,,	1 8-in. M.L.R., 8 9-in. smooth-bores, 1 60-pdr., 3 M., 4 l.	..	1882	..	11·0	160	..
cr.	Montgomery	2000	257 0	37 0	14 6	2	5400	,,	2 6-in., 8 5-in. Q.F., 6 6-pdr. do., 2 1-pdr. do., 2 M.	6 f. tu. or l.car	1892	..	18·87	435	6000
cr.	Newark P. 3″–2″	4083	310 0	49 0	18 9	2	8869	,,	12 6-in., 4 6-pdr. Q.F., 4 3-pdr. do., 2 1-pdr. do., 7 M.	..	1890	250,000	19·0	850	5500
to.g.b.	Number 1	750	260 0	27 0	8 4	2	6000	,,	3 4-in. Q.F., 4 6-pdr. do., 4 1-pdr. do., 2 M.	6 f. tu. or l.car	Building	..	23·0	..	..
cr.	Olympia (was Cr. No. 6) P. 4¾″–2″	5800	340 0	53 0	21 6	2	13,500	steel barbette 4½in.	4 8-in., 10 5-in. Q.F., 14 6-pdr. do., 6 1-pdr., do., 4 M.	6 f. tu. or l.car	1892	359,200	21·69	1893	10,000
g.v.	Petrel	890	176 3	31 0	11 7	1	1513	steel	4 6-in., 2 3-pdr. Q.F., 4 M.	..	1888	50,000	13·7	168	..
cr.	Philadelphia P. 4″–2½″	4413	315 0	48 6	19 3	2	10,500	,,	12 6-in., 4 6-pdr. Q.F., 4 1-pdr. do., 7 M.	5 f. tu. or l.car	1889	265,000	19·7	1175	7000
cr.	Raleigh P. 2½″	3183	291 3	42 0	18 0	2	10,000	,,	1 6-in., 10 5-in. Q.F., 8 6-pdr. do., 4 1-pdr. do., 2 M.	6 f. tu. or l.car	1892	28,600	19·0	556	4500
g.v.	Ranger (Surveying)	1020	173 10	31 10	12 10	1	656	iron	1 60-pdr. M.L. Parrott, 1 M.	..	1874	..	10·0	127	..
,,	San Francisco P. 3″–2″	4083	310 0	49 2	18 9	2	10,400	steel	12 6-in., 4 6-pdr. Q.F., 4 3-pdr. do., 2 1-pdr. do., 7 M.	6 f.tu. or l.car	1889	270,000	20·2	680	4200
,,	Vesuvius (Dynamite Gun Cruiser)	930	246 0	26 6	10 7½	2	4450	,,	3 dynamite guns, 15 in. cal., 3 3-pdr. Q.F.	..	1888	70,000	21·65	150	..
g.v.	Yantic	900	180 5	29 6	12 2	1	670	wood	1 8-in. M.L.R., 2 9-in. smooth-bore, 1 60-pdr., 1 M., 2 l.	..	1878	..	8·0	125	..
cr.	York Town	1703	230 0	36 0	14 0	2	3660	steel	6 6-in., 2 6-pdr. Q.F., 2 3-pdr. do., 2 1-pdr. do., 4 M.	2 l. car.	1888	98,000	17·2	400	6500

(*a*) Will receive a new armament.

* Quantity, it is stated, that can be stowed.

Three paddle steamers.—Michigan (685 tons and 300 horse-power), and the Monocacy (1370 tons and 850 horse-power), and the Thetis of 1250 tons building.
Ten screw steamers, of from 300 tons to 560 tons, and about 300 to 500 H.P.

SHIPS BELONGING TO POWERS WHOSE NAVIES ARE OF LITTLE OR NO IMPORTANCE.

Belgium.—Twelve steam vessels, principally employed as packets, which are under the orders of the Government. Seven of these steamers are of 578 tons.

Bulgaria.—Eleven steamers of small size, of which one is used as the Prince's Yacht. Two armoured gun-boats, for the defence of the Danube.

Egypt.—This power has now no efficient war ships.

Hayti.—An iron corvette—Dessalines—of 16 knots speed, and armed with one 7-inch gun and 6 small guns. Three iron or steel sloops :—St. Michael, 1804, and Toussaint L'Ouverture, of from 500 to 900 tons, all of 12 to 14 knots speed, and armed with one large and four to eight small guns. Gun vessel, 22nd of December, of 900 tons, 9 knots speed, armed with four 40-pdr. Armstrongs. Two small gunboats of 14 knots speed, armed with one 10-c.m. Q.F. gun, just completed in France.

Liberia.—The Gorronammal gunboat of 150 tons displacement; completed 1892, and another one, the Rocktown, completing at Rotterdam.

Mexico.—The Zaragoza, built of steel, 1200 tons, 1300 horse power, 15 knots speed, and armed with four 12-c.m. guns and 4 rapid firing guns. Two gun vessels of 450 tons, and 11 knots speed, armed with two 6½-inch muzzle loaders and two small guns. Two small gunboats of 10 knots speed.

Morocco.—A cruiser, which will carry four guns, built or building in Italy.

Persia.—Despatch vessel—the Persepolis—of 1200 tons and 10 knots speed. She is armed with 5 small breech-loading guns.

Peru.—Lima, built in 1881, of 1700 tons displacement, 1800 horse-power, and 16-knots speed; armed with two 6-in. B.L.R. guns. Screw steamer Santa Rosa of about 400 tons.

Roumania.—The Elizabeta, a protected cruiser (deck 3 in. thick), built in 1887. She is 230 ft. long, 32 ft. 10 in. broad, has 1320 tons displacement, 4500 horse-power, 18 knots speed, and carries 4 17-c.m. B.L.R. guns, 4 quick-firing guns, 4 machine guns, and 4 torpedo launching tubes.

Three coast-guard vessels—Olthul, Siretul, and Bistriti—length, 100 ft.; breadth, 13½ ft.; draught of water, 6 ft.; speed, 11 knots natural draught, and 13¼ knots with forced draught. They carry 3 machine guns. They were built by the Thames Ironworks Co. in 1888.

Six gunboats of 45 to 110 tons, 7 to 9 knots speed.

One screw steamer (two guns, two machine guns).

Sarawak.—Two gunboats, of 175 and 118 tons respectively, of low speed, each armed with two guns.

Siam.—Two corvettes (1000 tons, 8 guns); three gun-vessels; four gunboats. One protected deck cruiser, 290 ft. long, 39 ft. 4 in. broad, of 2500 tons displacement and 17 to 18 knots speed; armament, four 12-c.m. Q.F. guns, and ten 6-pdr. Q.F. guns.

Uruguay.—Gunboats: General Artiga, 274 tons, 12½ knots speed, 2 12-c.m. (Krupp), 2 M.; General Rivéra, 300 tons, 12 knots speed, armed with 1 15-c.m. and 1 6-c.m. gun; and the General Jaurez.

BRITISH AND FOREIGN TORPEDO-BOAT FLOTILLAS.

The following tables are substantially those which appeared in last year's *Naval Annual*. Certain tables have, however, been abbreviated, with a view to saving space, and all have, so far as is possible, been corrected and brought up to date. The notes which were given last year have this year been omitted, it being deemed unnecessary to reprint them; but a few fresh notes, dealing for the most part with new constructions of the past twelve months, have been introduced. Again I have to thank many of the great builders of torpedo-boats for the information with which they have been so good as to furnish me. I regret, nevertheless, that all those to whom I wrote, did not reply, and that many who did reply declined, for various reasons, to answer my questions. To these facts must be set down any omissions or inaccuracies which may be detected. Full details of nearly all new large ships are easily obtainable, and the launching or condemnation of any vessels of that kind is always chronicled in the service journals of the countries to which they belong; but with torpedo-boats the case is very different. They are begun without much publicity, and they are launched and completed, on the one hand, or lost or disposed of, on the other, with so little fuss, that the following of their fortunes is a task of extreme difficulty, unless one be aided by those who have special and personal reasons for keeping themselves informed, and peculiar advantages for doing so.

In continuation of the summary of last year a synopsis is given below of the various boats, other than submarine boats, which appear in the tables :—

Power.	Destroyers. above 150 ft.	Sea-going. 126 ft. to 150 ft.	1st Class. 115 ft. to 125 ft.	2nd Class. 101 ft. to 114 ft.	3rd Class. 86 ft. to 100 ft.	Vedettes. 85 ft. and under.	Summary. Boats of 101 ft. and above.	Summary. Boats of 100 ft. and under.	Total.
Great Britain ..	42	43	26	4	20	73	115	93	208
British Possessions	..	8	..	1	..	11	9	11	20
Argentine Republic	..	8	..	..	4	14	8	18	26
Austria-Hungary ..	..	24	..	5	26	8	29	34	63
Brazil	5	2	..	5	..	12	12	12	24
Chile	..	..	1	..	8	4	1	12	13
China	..	2	1	25	2	13	28	15	43
Costa Rica	..	..	..	..	..	1	..	1	1
Denmark	..	6	1	3	2	11	10	13	23
France	8	38	62	84	36	17	192	53	245
Germany	10	64	59	4	..	16	137	16	153
Greece	..	6	..	..	11	13	6	24	30
Italy	13	86	..	4	10	19	103	29	132
Japan	1	..	3	16	20	..	20	20	40
Mexico	..	5	..	..	..	..	5	..	5
Netherlands	..	6	9	3	2	23	18	25	43
Norway	..	..	..	5	3	2	5	5	10
Portugala	..	5	3	..	1	2	8	3	11
Roumani	..	3	3	..	..	2	6	2	8
Russia	12	55	6	1	..	108	74	108	182
Spain	..	11	25	2	..	9	38	9	47
Sweden	..	..	13	8	13	7	21	20	41
Turkey	2	7	15	..	7	..	24	7	31
United States ..	..	2	..	..	1	4	2	5	7

Great Britain and Dependencies.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
Great Britain.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
TORPEDO-BOAT DESTROYERS													
Ardent	Chiswick	Bldg.	200	19	6·8	2	250	4,000	27	1–12 pr. 3–6 prs.	2	45	60
Boxer	Chiswick	Bldg.	200	19	6·8	2	250	4,000	27	1–12 pr. 3–6 prs.	2	45	60
Bruiser	Chiswick	Bldg.	200	19	6·8	2	250	4,000	27	1–12 pr. 3–6 prs.	2	45	60
Charger	Poplar	Bldg.	190	18·5	5·25	2	220	3,200	..	1–12 pr. 3–6 prs.	2	45	60
Conflict	East Cowes	Bldg.											
Daring	Chiswick	1893	185	19	6·8	2	220	3,500	27	1–12 pr. 3–6 prs.	3		
Dasher	Poplar	Bldg.	190	18·5	5·25	2	220	3,200	..	1–12 pr. 3–6 prs.	2	45	60
Decoy	Chiswick	1894	185	19	6	2	220	3,500	27	1–12 pr. 3–6 prs.	3		
Ferret	Birkenhead	1893	180	18·5	5	2	220	3,400	27				
Fervent	Paisley	Bldg.											
Hardy	Sunderland	Bldg.	196	19	5	2	245	4,000	27	..	2	..	60
Hasty	Poplar	Bldg.	190	18·5	5·25	2	220	3,200	..	1–12 pr. 3–6 prs.	2	45	60
Haughty	Sunderland	Bldg.	196	19	5	2	245	4,000	27	..	2	..	60
Havock	Poplar	1893	180	18·5	5·25	2	220	3,400	26·7	1–12 pr. 3–6 prs.	3	43	57
Hornet	Poplar	1893	180	18·5	5·25	2	220	3,500	28	1–12 pr. 3–6 prs.	3	43	57
Janus, Lightning	Jarrow	Bldg.											
Lynx	Birkenhead	1894	180	18·5	5	2	220	3,400	27				
Porcupine	Jarrow	Bldg.											
Rocket	Clydebank	Bldg.											
Salmon	Hull	Bldg.	200	19·5	5·5	..	250	4,000	27	1–12 pr. 3–6 prs.	2	..	60
Shark	Clydebank	Bldg.											
Skate	Barrow	Bldg.	195	20·5	..	2	240	4,000	27				
Snapper	Hull	Bldg.	200	19·5	5·5	..	250	4,000	27	1–12 pr. 3–6 prs.	2	..	60
Starfish, Sturgeon	Barrow	Bldg.	195	20·5	..	2	240	4,000	27				
Sunfish	Hebburn	Bldg.											
Surly	Clydebank	Bldg.											
Swordfish	Elswick	Bldg.	200	19	5·25	2	264	4,000	27	1–12 pr. 5–6 prs.	3	45	60
Teazer, Wizard	East Cowes	Bldg.											
Zephyr	Paisley	Bldg.											
Ten others		Bldg.											
FIRST CLASS—													
1 (*ex* Lightning)	Chiswick	1877	84·6	10·9	5	1	27	460	19	..	1		
2–9 (8 boats)	Chiswick	1878–9	87	10·9	4	1	28	450	20	..	1	15	
10	Chiswick	1880	90·5	10·9	4	1	28	450	21·7	..	1	15	
11, 12 (2 boats)	Chiswick	1880	87	10·9	4	1	28	450	20	..	1	15	7
13	Lambeth	1878	87	10·9	4	1	28	460	21	..	2	15	7
14	Poplar	1878	87	11	4·5	1	33	550	22	..	2	15	7
15	..	..	87	10·9	4	1	28	450	21	..	2	15	7
17, 18 (2 boats)	Poplar	1878	87	11	4·5	1	33	450	21	..	2	15	7
19	East Cowes	1878	87	10·9	4	1	28	460	21	..	2	15	7
20	..	1880	87	10	4	..	28	360	16·9	..	..	15	
21, 22 (2 boats)	Chiswick	1885	113	12·5	5·7	1	63	730	20	..	3	..	10
23, 24 (2 boats)	Poplar	1885–6	113	12·5	5·5	1	67	600	19·5	2–3 prs.	3		
25–29 (5 boats)	Chiswick	1886	127·5	12·5	6·2	1	60	600	21	..	4	15	
30–33 (4 boats)	Poplar	1886	125	13	5·5	1	60–66	670	19·5	2–3 prs.	5	15	20
34–38 (5 boats)	East Cowes	1886	125	14·6	4	1	60–66	950	18–19	..	5	15	
39, 40 (2 boats)	(Purchased)	1885	100	..	..	..	40	500	..	..	1	15	
41–60 (20 boats)	Chiswick	1886	127·5	12·5	6·2	1	60	700	21	2–3 prs.	4	15	
61, 63–74, 76–78 (16 boats)	Poplar	1886	125	13	5·5	1	75	700	19–20	2–3 prs.	5	15	20
79	Poplar	1886	125	13	5·5	..	75	1,000	22·4	2–3 prs.	..	15	20
80	Poplar	1887	135	14	6	1	105	1,540	23	4–3 prs.	5	21	30
81 (*ex* Swift)	East Cowes	1885	150	17·5	..	1	125	..	..	6–3 prs.	3	25	35
82–87 (6 boats)	Poplar	1889	130	13·5	5·5	1	85	1,100	23	3–3 prs.	3	19	20
88, 89 (2 boats)	Poplar	1894	142	14·75	4	1	112	1,600	..	3–3 prs.	3	18	20
90	Poplar	Bldg.	140	14·25	3·75	1	100	1,430	..	3–3 prs.	3	18	18
91, 92 (2 boats)	Chiswick	1894	140	15·5	7·3	1	130	..	23·5	3–3 prs.	3	18	
93	Chiswick	1893	140	15·5	7·3	2	130	2,000	23·5	3–3 prs.	3	18	
94–96 (3 boats)	East Cowes	Bldg.	140	15·5	..	1	130	2,000	23	3-3 prs.	3	18	
97	Birkenhead	1893	140	15·5	..	1	130	2,000	23	3–3 prs.	3	18	
SECOND CLASS—													
38–48 (10 boats)	Poplar	1889	60	9·2	3·7	1	16·5	230	16·5	1 mach.	1	9	1
49, 50 (2 boats)	Poplar	1887	60	8·5	3	1	15	200	17	1 mach.	1	9	1
51–62 (12 boats)	Chiswick	1878–9	60·5	7·5	3·5	1	..	..	15–16	..	2	7	
63	..	1879	60	..	..	1	..	..	15	..	2		
64–73 (10 boats)	Chiswick	1880–1	60·5	7·5	3·5	1	..	..	16–17	..	2	7	
74, 75, 96, 97 (4 boats)	Poplar	1883	62	7·6	3·6	1	12	..	16	1 mach.	2	7	
76–95 (20 boats)	Chiswick	1882–3	63	7·5	3·5	1	..	..	16·5–17	..	2	7	
98	Chiswick	1883	66·3	7·5	2·5	hyd.	..	120	12	..	2	7	
99, 100 (2 boats)	Chiswick	1886	64	8	3·6	1	..	..	15·5–16·8	..	2	7	
101	..	..	64	..	..	..	..	..	..	..	2	7	
1–9 (9 boats)	East Cowes	..	56	..	..	1	12	..	14·5	2 mach.	..	..	·7

Great Britain and Dependencies—*continued.*

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Victoria.													
Childers	Chiswick ..	1883	113	12·5	5·9	1	65	730	20	2–1 prs.	..	12	10
One boat	Poplar	1891	130	13·5	5·7	1	82	1,150	23	3–3 prs.	3	19	20
Nepean, Lonsdale (2 boats)	Chiswick ..	1884	63	7·5	3·2	1	12	150	17·5	..	1	7	
New South Wales.													
Acheron, Avernus (2 boats)	..	1879	..	..	..	1	16	300	16				
Queensland.													
Mosquito	Chiswick ..	1884	63	7·5	3·2	1	12	..	17	..	1	7	
Wasp	..	..	..	..	..	..	12	..	..	..	..	7	
Tasmania.													
One boat	Chiswick ..	1884	63	7·5	3·2	1	12	..	17	..	1	7	
New Zealand.													
Nos. 1–4 (4 boats)	Chiswick ..	1884	63	7·5	3	1	12	170	17	1 mach.	Sp.		
India.													
Nos. 1–3 (3 boats)	Chiswick ..	1888	134·5	14·8	7·1	1	96	1,270	23·2	2 Q.F.	5		
Nos. 4–6 (3 boats)	East Cowes ..	1889	130	14·6	..	..	95	1,030	20				
No. 7	Paisley	1888	130·4	14	..	..	92	1,060	21				

NOTE.—In these lists "Chiswick" represents Messrs. John T. Thornycroft and Co.; "Poplar," Messrs. Yarrow and Co.; "East Cowes," Mr. J. S. White; "Birkenhead," Messrs. Laird Brothers; "Paisley," Messrs. Hanna, Donald and Wilson; "Sunderland," Messrs. William Doxford and Sons; "Jarrow," Palmer's Shipbuilding and Iron Co., Ltd.; "Clydebank," J. and G. Thomson, Ltd.; "Barrow," the Naval Construction and Armaments Co., Ltd.; "Hull," Earle's Shipbuilding and Engineering Co., Ltd.; "Hebburn," R. W. Hawthorn, Leslie and Co., Ltd.; "Elswick," Sir W. G. Armstrong, Mitchell and Co., Ltd.

The Decoy and Daring have Messrs. Thornycroft's water-tube boilers, working at a 210 lb. pressure. The engines are of the four-cylindered triple-expansion type.

The Havock has tri-compound engines, with cylinders of 18 in., 26 in., and 39·5 in. in diameter and 18 in. stroke, and two locomotive marine boilers with copper fire-boxes and copper tubes. The grate-surface is about 100 and the heating-surface about 5,000 sq. ft. On a three hours' run she made a mean speed of over 26 knots. On the mile, with 362 revolutions, 165 lb. pressure and 3,500 indicated horse-power, the air-pressure being only between 2 and 3 in. of water, she made a mean speed of 26·783 knots, and did her fastest mile at the rate of 27·565 knots. The boilers are designed for 180 lb. working pressure, and the air-pressure allowed by the Admiralty was 5 in. of water, so that greater speed could have been attained had the vessel been pressed. At an eight hours' trial in November, 1893, it was found that with 60 tons of coal on board she could, at economical speed, steam 3,500 knots. The consumption at 10 knots was 3¼ cwt., and at 11 knots less than 5 cwt. an hour. She has thirteen cross-bulkheads, thirty watertight compartments, and fourteen auxiliary engines. The main engines and boilers occupy 76 ft. of the vessel's length. The propellors are three-bladed.

The Hornet has engines like those of the Havock, but has Messrs. Yarrow's patent tubulous boilers. These are eight in number, with a working pressure of 180 lb. per sq. inch. Each weighs 5 tons 7 cwt., and can evaporate 12,500 lb. of water an hour. With four boilers only on board, the vessel did 23·3 knots. At her trial she attained a mean speed of 28·02 knots, and an extreme speed of 28·333 knots. She has four funnels.

The torpedo-boat destroyers at present unnamed have already been contracted for. Of these, it appears that three are to be built at Elswick and two at Hebburn-on-Tyne; but owing to orders which have been issued by the Admiralty, unusual reticence is observed concerning them, and it has been found impossible to obtain precise information.

No. 93 attained excellent results at her trials. She has triple-expansion three-cylindered engines and Thornycroft water-tube boilers. On the mile, on 14th December, 1893, with a steam-pressure of 225 lb. per sq. inch, the engines made 472 revolutions a minute, and the speed was 23·846 knots. At the three hours' run on 21st December, the mean revolutions per minute were 467, and the mean speed was 23·5 knots. She alone, among the new torpedo-boats built for the British Government, has twin-screws.

It has been stated that some or all of the Clydebank destroyers are to have Normand boilers; that the Jarrow boats are to have the same; that the East Cowes vessels are to have Mr. White's own boilers; that the Paisley boats are to have locomotive boilers; that Elswick will use the Babcock and Wilcox boiler; and that Hebburn and Barrow will use the Blechynden boiler. The cost of these destroyers will vary somewhere between £34,000 and £38,000 a-piece. All are to be fitted with three 18-in. torpedo-ejectors.

Nos. 91 and 92 have four cylindered triple-expansion engines supplied by two Thornycroft water-tube boilers.

Experiments with aluminium instead of brass tubes and fittings for the ejection of torpedoes have been begun. It is estimated that the substitution will enable a saving of 3¼ tons to be effected in the weights of one of the new first-class boats carrying three ejectors.

Argentine Republic.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
2 boats	Chiswick ..	1890–1	150	14·5	5·2	2	110	1,500	24·5	3 3-prs.	3	27	22
6 boats	Poplar.. ..	1890	130	13·5	6	1	85	1,200	23–24	2 3-pr. Q.F.	2	15	15
4 boats	Poplar.. ..	1880–2	100	12·5	6	1	52	600	20	2 mach.	3	14	10
SECOND CLASS—													
Nos. 1–8 (8 boats) ..	Poplar.. ..	1890	60	9.2	3	1	16	230	17	1 Q.F.	1	10	1.25
Nos. 9–10 (2 boats)	Chiswick ..	1881	60·5	7·5	3·5	1	..	..	17	..	sp.		
VEDETTE BOATS—													
Nos. 1–4 (4 boats) ..	..	..	..	..	..	..	..	..	..	..	sp.		

The two 150-ft. boats are named Comodoro Py and Murature.
The six 130-ft. boats are named Bathurst, Buchardo, Jorge, King, Pinedo, and Thorne.
The four 100-ft. boats are named Alerta, Centelia, Ferre, and Py.

Austria-Hungary.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
2 boats	Poplar.. ..	1885	135	13·7	5·6	1	95	1,250	22·4	2 Nord.	2	16	28
22 boats	Elbing, Trieste, &c.	1886-9	128	15·9	6·9	1	83	900 1,000	17·5 to 21·5	2 mach.	2	15	28
SECOND CLASS—													
Nos. 9–34 (26 boats)	Pola, Elbing, Chiswick, and Poplar.	..	67	8·5	3·5	1	..	..	18	1 mach.	2		
		..	86	11	4	1	33	450	19·5				
		..	87	10·8	5	1	..	..	18				
		..	100	12	4·5	1	50	500	21				
Nos. 35–39 (5 boats)	Pola	..	..	..	..	1	63	..	20·5				
Nos. 1–8 (8 boats) ..	Pola and Poplar ..	..	..	..	..	1	27	250	15–18				

The two 135-ft. boats are named Adler and Falke.
The twenty-two 128-ft. boats are named :—Bussard, Condor, Elster, Flamingo, Gaukler, Geier, Habicht, Harpie, Ibis, Kibitz, Krähe, Kranich, Kukuk, Marabu, Rabe, Reiher, Secretär, Sperber, Staar, Uhu, Weihe, Würger.

Brazil.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
Nos. 1–5 (5 boats)	Poplar.. ..	1882	110	12·5	5·5	1	52	600	20	2 mach.	2	16	20
Araguary	Chiswick ..	1891	150	14·5	5·2	2	150	1,550	25·1	2 Q.F.	4	27	22
Iguatemi	Chiswick ..	1891	150	14·5	5·2	2	150	1,550	25·4	2 Q.F.	4	27	22
Marcilio Diaz	Chiswick ..	1891	150	14·5	5·2	2	150	1,550	25·4	2 Q.F.	4	27	22
5 boats	Elbing ..	1892–3	152	17·2	7·9	2	130	2,200	26	2–1 prs.	3	24	30
SECOND CLASS—													
4 boats	..	1883–4	..	..	..	1	17	..	17	..	..	10	
1 boat	Chiswick ..	1885	63	75	3·2	1	..	..	17				
1 boat	Poplar.. ..	1886	60	8	3	1	14	200	17	..	1	..	2
THIRD CLASS—													
5 boats	Chiswick ..	1883	45	6	1·2	1	3·5	...	12-13	1 mach.	sp.		

Brazil—*continued.*

A torpedo boat, probably a Poplar first-class one, was sunk in Rio Harbour by fire from a Government fort on November 8th, 1893.

Soon after the outbreak of hostilities the legitimate Government of Brazil purchased, through a Scotch firm, from Messrs. Schichau, of Elbing, five twin-screw 152-ft. torpedo-boats, of the Russian Adler or Italian Aquila class, which the German firm happened to have ready. The boats, manned by German crews, left Elbing in November, 1893, and met with terrible weather in the Baltic, and again in the North Sea and Channel. They remained at Dartmouth until the cessation of the fierce south-west gales of December, and then, without convoy, went by way of Las Palmas to St. Vincent, where they coaled for the last time. They had been instructed to reach Pernambuco with a reserve of coal, in view of the possibility that Melloist cruisers might chase them off the coast, and so they steamed with one boiler only, and at no more than 12 knots. All five boats made their port within twelve hours after the arrival of the first. Each had on board a captain and fifteen men. There were no breakdowns whatever, and the boats were ready, on arriving, to go into action.

Chile.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
3 boats	Poplar.. ..	1881	86	12·5	..	1	25	400	19–20	..	4	15	
5 boats	Poplar.. ..	1881	100	12·5	..	1	35	400	18–19	4 mach.	4	15	9
Sergente Aldea ..	Poplar.. ..	1886	125	13·5	5·5	1	70	800	20	2 Q.F.	4	18	15
Second Class—													
Colocolo	..	1880	50	9	..	..	5	40	16	2 mach.	2		
Tucapel	..	1880	50	9	..	..	5	40	16	2 mach.	2		
1 boat	East Cowes	1887	50	..	..	..	..	..	16				
1 boat	East Cowes	1892	60	9·6	5	1	15	270	19	..	1		

The three 86-ft. boats are named Fresia, Lauca, and Quidora.
The five 100-ft. boats are named Glaura, Guale, Janequeo, Rucamilla and Tegualda.

China.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
1 boat	Elbing ..	1886	144·3	16·4	7·5	1	128	1,600	24·2	4 1-pr. revs.	2	20	15
1 boat	Poplar.. ..	1887	128	13	5	1	69	1,000	23·9	{3 Q.F., 4 Gatlings}	3	28	15
25 boats	Stettin, &c. .	1886–87	110	13	4·9	1	65	1,000	19·5	2 1-pr. revs.	3	16	10
2 boats	Stettin ..	1883	86	10·4	3·4	1	28	650	18·2	2 1-pr. revs.	2	16	12
1 boat	Stettin ..	1884	123·5	21·7	..	..	..	..	19	..	5	16	
Second Class—													
11 boats	Elbing ..	1885–86	85	11·9	4·8	1	27	400	19	..	1	..	5
2 boats	China	..	52	6·7	3·3	1	..	..	16				

Costa Rica.

Costa Rica has one 62-ft. boat.

Denmark.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
Delfinen	Chiswick ..	1883	111·5	12·6	6	1	59	620	19·5	1 mach.	2	14	9
Haien	Chiswick ..	1879	94	10·5	5	1	32	350	21·3	1 mach.	1	12	4
Havhesten	Chiswick ..	1888	137·9	14	7	1	94	1,200	22·8	2 1-pr. revs.	4	20	15
Hvalrossen	Chiswick ..	1884	114	12·6	6·5	1	64	660	19·3	1 mach.	2	14	10
Makrelen	Copenhagen	1893	140	14·2	7	2	112	1,200	..	..	..	..	16
Narhvalen	Chiswick ..	1888	137·9	14	7	1	94	1,200	22·8	2 1-pr. revs.	4	20	15
Nord Kaperen.. ..	Copenhagen	1893	140	14·2	7	2	112	1,200	..	..	..	..	16
Sóløven	Chiswick ..	1887	131	14·8	6·8	1	89	1,200	23	2 mach.	4	20	14
Sóulven	Havre.. ..	1880	94·8	10·9	3·9	1	37	450	18·1	..	2	12	5
Springeren	Copenhagen	1891	119	13	4·9	1	81	800	18·3	2 1-pr. revs.	2	20	14
Stóren	Chiswick ..	1887	131	14·8	6·8	1	89	1,200	23	2 mach.	4	20	14
Sværdfisken	Chiswick ..	1881	110	12	6	1	49	600	20·7	1 mach.	2	14	9
Second Class—													
Nos. 4, 5 (2 boats) ..	Chiswick ..	1882	63	7·5	2·5	1	15	150	16·9	1 mach.	2	6	1
Nos. 6, 7 (2 boats) ..	Chiswick ..	1884	66·8	8	4·2	1	16	170	15·4	1 mach.	2	6	1·5
Nos. 8, 9 (2 boats) ..	Chiswick ..	1886	69·5	8·1	3·8	1	17	170	15·7	1 mach.	2	6	1
Nos. 10, 11 (2 boats).	Chiswick ..	1888	70·2	8	4	1	18	180	15·8	1 mach.	2	6	1
Nos. 12, 13 (2 boats).	Chiswick ..	1889	78·3	9	4·9	1	24	350	18	1 mach.	2	8	3
1 boat	Chiswick ..	1875	58	7·5	3	1	..	..	16	..	sp.		

France.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
Sea-Going—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Agile	La Seyne ..	1889	139	14·7	7·7	2	103	1,100	20·4	3–3 prs.	2	26	14
Alarme	St. Nazaire	1888	151	15·7	8·3	2	148	1,400	20·5	2–3 prs.	4	30	40
Aquilon	Normand ..	Bldg.	138	14·7	8·2	2	118	2,000	..	2–3 prs.	2	26	17
Archer	Normand ..	1893	138	14·7	6·5	2	120	1,250	21	2–3 prs.	2	26	17
Argonaute..	St. Denis ..	1893	141	16·4	9·3	2	117	1,500	23·5	2–3 prs.			
Ariel	Normand ..	1893	141	16·4	9·3	2	117	1,500	23·5	2–3 prs.			
Audacieux	La Seyne ..	1889	139	14·7	7·7	2	103	1,100	20·3	3–3 prs.	2	26	14
Aventurier	St. Nazaire..	1888	151	15·7	8·3	2	148	1,400	20·5	2–3 prs.	4	30	40
Averne	Havre ..	1893	141	16·4	9·3	2	117	1,500	23·5	2–3 prs.			
Cerbère	..	Bldg.	138	14·7	8·2	2	118	1,400	..	2–3 prs.			
Chevalier	Normand ..	1893	144·3	15·7	6·8	2	123	2,700	27·2	2–1 prs.	2	..	16
Corsaire	St. Denis ..	1892	160·5	15	5·4	2	150	2,500	25·5	4–1 prs.	2	..	15
Coureur	Chiswick ..	1888	147·5	14·5	4·6	2	120	1,550	24·5	4 Nords.	2	27	22
Dauphin	Havre ..	1894	141	16·4	9·3	2	117	1,500	23·5	2–3 prs.			
Défi	St. Nazaire..	1888	151	15·7	8·3	2	148	1,400	21	2–3 prs.	4	30	40
Dragon	Normand ..	1892	138	14·7	8·2	2	118	1,400	25	2–3 prs.	2	26	15·5
Eclair	La Seyne ..	1891	144·3	14·7	7·7	2	106	1,100	21·5	3–3 prs.	2	26	17
Flibustier	Normand ..	1893	143	16·4	9·3	2	117	1,500	23·5	2–3 prs.			
Forban	Normand ..	Bldg.	144·2	15·2	10	2	130	3,200	30	2–1 prs.	2		
N (as Forban)	Normand ..	Bldg.	144·2	15·2	10	2	130	3,200	30	2–1 prs.	2		
Grenadier	Normand ..	1892	138	14·7	8·2	2	118	1,400	25·2	2–3 prs.	2	26	15·5
Grondeur	Havre	1892	147·5	14·5	5	2	114	1,550	24	2–3 prs.	2	27	20
Kabyle	La Seyne ..	1891	144·3	14·7	7·7	2	106	1,100	21·6	3–3 prs.	2	26	17
Lancier	Normand ..	1893	138	14·7	8·2	2	118	1,400	25·8	2–3 prs.	2	26	15·5
Lansquenet	Nantes ..	1893	165·4	15·8	4·2	2	138	2,800	26	2–3 prs.			
Mousquetaire	Havre ..	1893	154	15·7	7	2	125	2,100	24·7	2–1 prs.	2	..	18
Orage	La Seyne ..	1891	144·3	14·7	7·7	2	106	1,100	21·7	3–3 prs.	2	26	17
Ouragan	Nantes ..	1887	151	15·7	8·3	2	148	1,400	20	2–3 prs.	4	30	40
Sarrazin	Bourdeaux..	1893	139	14·7	7·7	2	103	1,100	20·5	3–3 prs.	2	26	14
Téméraire	St. Nazaire..	1888	151	15·7	8·3	2	148	1,400	21	2–3 prs.	4	30	40
Ténare	..	Bldg.	138	14·7	8·2	2	118	1,400	..	2–3 prs.			
Tourbillon	Bourdeaux ..	1892	139	14·7	7·7	2	103	1,100	20·5	3–3 prs.	2	26	14
Tourmente	St. Denis ..	1893	141	16·4	9·3	..	117	1,500	23·5	2–3 prs.			
Turco	St. Denis ..	1892	138	14·7	8·2	2	118	1,400	21·3	2–3 prs.	2	26	15·5
Véloce..	Havre	1891	147·5	14·5	5	2	114	1,550	23·6	2–3 prs.	2	27	20
Zouave	St. Denis ..	1892	138	14·7	8·2	2	118	1,400	21·3	2–3 prs.	2	26	15·5

France—*continued*.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
FIRST CLASS—													
Balny	Normand ..	1886	134·5	11	7·2	1	67	700	20	2–1 pr. rev.	2	21	
Bouët-Villaumez	St. Denis ..	1888	134·5	11	7·2	1	67	700	20	2–1 pr. rev.	2	21	
Capt. Cuny	..	1886	134·5	11	7·2	1	67	700	20	2–1 pr. rev.	2	21	
Capt. Mehl	..	1886	134·5	11	7·2	1	67	700	20	2–1 pr. rev.	2	21	
Challier	..	1886	134·5	11	7·2	1	67	700	20	2–1 pr. rev.	2	21	
Dehorter	St. Denis ..	1886	134·5	11	7·2	1	67	700	20	2–1 pr. rev.	2	21	
Deroulède	Normand ..	1886	134·5	11	7·2	1	67	700	20	2–1 pr. rev.	2	21	
Doudart de Lagrée	Normand ..	1886	134·5	11	7·2	1	67	700	20	2–1 pr. rev.	2	21	
Edmond Fontaine	St. Denis ..	1888	134·5	11	7·2	1	67	700	20	2–1 pr. rev.	2	21	
151 (*ex* G. Charmes) ..	La Seyne ..	1886	132·5	12·5	6·6	..	74	560	18·8	2–1 prs.	..	23	
126–129 (4 boats)	Normand ..	1888–9	118	13·2	8·7	2	78	1,250	21	2–1 prs.	2	21	10
145–149 (5 boats)	Normand ..	1891–3	118	13·2	8·7	2	75	1,300	23·9	2–1 prs.	2	21	10
152–154 (3 boats)	Normand ..	1892–	118	13·2	8·7	2	75	1,300	24·6	2–1 prs.	2	21	10
155–157 (3 boats)	Bourdeaux ..	1893	118	13·2	8·7	2	79	1,300	23	2–1 prs.	2	21	10
158–160 (3 boats)	Cail	1893	118	13·2	8·7	2	79	1,300	23	2–1 prs.	2	21	10
161–163 (3 boats)	St. Nazaire ..	1892	118	13·2	8·7	2	79	1,300	23	2–1 prs.	2	21	10
164–166 (3 boats)	La Seyne ..	1892	118	13·2	8·7	2	79	1,300	23	2–1 prs.	2	21	10
167–169 (3 boats)	Creusot ..	1892	118	13·2	8·7	2	79	1,300	23	2–1 prs.	2	21	10
170, 171 (2 boats)	Normand ..	1893	118	13·2	8·7	2	79	1,300	23	2–1 prs.	2	21	10
172–176 (5 boats)	Creusot ..	1893	118	13·2	8·7	2	79·5	1,390	23	2–1 prs.	2	21	10
177–179 (2 boats)	Havre	1893	118	13·2	8·7	2	79·5	1,300	23	2–1 prs.	2	21	10
180, 181 (2 boats)	Creusot ..	1893	118	13·2	8·7	2	79·5	1,300	23	2–1 prs.	2	21	10
182–191 (10 boats) ..	..	1893–4	118	13·2	..	..	79·5						
192–200 (9 boats)	..	Bldg.	118	13·2	8·7	2	79·5	1,300	23·5	2–1 prs.	2		
P. 20–P. 24 (5 boats) ..	..	Bldg.	..	..	..	2	80	1,350	22·5	2–1 prs.	2	21	10
SECOND CLASS—													
26	..	1878	108	11	5·6	1	45	400	19	..	2	16	
27	..	1878	104·4	10·6	6·1	1	44	400	19	..	2	16	
28	..	1878	111·5	11	5·6	1	44	400	19	..	2	16	
60–64 (5 boats)	..	1878–85	108·2	10·3	6·1	1	45	400	19	..	2	16	
65, 66, 68 (3 boats) ..	..	1878–85	108·2	10·7	6·4	1	49	500	20	..	2	16	
69–74 (6 boats)	..	1878–85	108·2	10·7	6·5	1	50	500	20	..	2	16	
75–109 (35 boats)	Cail, etc. ..	1885–92	114·7	10·6	6	1	56	525	20	2–1 prs.	2	16	10
111–125 (12 boats) ..	La Seyne, etc.	1885–90	114·7	10·6	6	1	56	525	20	2–1 prs.	2	16	10
130–144 (15 boats) ..	Normand, etc.	1889–90	111·5	11·4	6	1	52·8	520	21	2–1 prs.	2	16	
150	..	..	114·7	10·6	7	1	54	520	20	2–1 prs.	2	16	10
Q. 1–Q. 4. (4 boats) ..	..	Bldg.	..	..	..	..	53	700	20·5	2–1 prs.	2	16	
THIRD CLASS—													
8–19 (12 boats)	Various Firms in France and England.	1877–82	86	10·2	5	1	27	200–450	16–19	..	..	10	
20			87	10·8	5	1	33			..	..	10	
22, 23 (2 boats)			87·6	10·4	5·2	1	30			..	..	10	
24, 25 (2 boats)			88·5	10·4	6	1	30			..	..	10	
31, 32 (2 boats)			85·5	10·4	3·8	1	27			..	..	10	
33–36 (4 boats)			89	10·4	6	1	32			..	..	10	
37–40 (4 boats)			87	10·8	5	1	32			..	..	10	
41, 42 (2 boats)			87	10·8	6	1	33			..	..	10	
43, 44 (2 boats)			89	10·4	5·7	1	32			..	..	10	
47			87	10·8	5	1	33			..	..	10	
48			89	10·4	5·8	1	32			..	..	10	
49, 50, 53 (3 boats) ..			87	10·8	5	1	32			..	..	10	
54, 55 (2 boats)			91	10	6·1	1	32			..	..	10	
VEDETTE BOATS—													
(9 boats)	..	1893–4	62·3	..	..	..	14	210	16·3	..	..	8	
29, 30 (2 boats)	Chiswick ..	1876	67	8·5	3·5	1	..	..	18	..	..	8	
56, 57 (2 boats)	Chiswick ..	1879	59	7·5	3·5	1	12	50	16	..	..	..	
58, 59 (2 boats)	Chiswick ..	1881	63	7·5	3·5	1	11	50	17	..	..	..	
SUBMARINE—													
Goubet	..	1888	18·3	3·2	5	..	6	..	5	..	..	2	
Gustave Zédé	Toulon ..	1893	131	..	..	1	266	720	14	..	..	8	
Gymnote	Mourillon ..	1888	59	5·9	5·9	1	29·5	60	4–6	..	..	4	
Morse	Cherbourg ..	Bldg.	..	..	..	..	146						

NOTE.—In the above list Havre *means* the Chantiers of the Cie. de la Méditerranée at that place, as distinct from the yard of MM. Normand, which is also at Havre.

France—*continued.*

The Archer, though a new boat, contains the machinery and boilers of the older boat Avant-Garde, which was lost in February, 1890.

The Averne was guaranteed to do 23·5 knots. During an informal run preparatory to her trials in February, 1894, she easily did 24 knots, while keeping plenty of power in reserve.

The Forban is being constructed partly of steel and partly of aluminium.

The Mousquetaire, at one of her trials, steamed at the rate of 25·4 knots for twenty minutes. The contract speed was 24·5 knots. She did 24·7 knots for three consecutive hours.

In January, 1894, the Sarrazin, while undergoing trials, was the scene of a terrible and fatal explosion. She had been fitted by her builders, the Société des Ateliers de la Gironde (Usines Cail), of Bourdeaux, with Babillot boilers. The principle of these consists of a series of tubes, each containing an inner tube. The water circulates between the two tubes, and the flame outside the outer and inside the inner one. The cause of the disaster was the rupture in a longitudinal direction of one of the outer tubes. A similar accident had occurred in September, 1892, in boat No. 158, which also had Babillot boilers. After the accident to the Sarrazin, she, her sister the Tourbillon, and Nos. 155–160 inclusive, were returned to their builders to have these dangerous boilers removed and others substituted for them.

In December, 1893, No. 96, returning into port at Toulon at night, collided with a buoy, and knocked a large hole in her bows.

In October, 1893, No. 112, while engaged in night manœuvres off Cherbourg, ran aground and so seriously damaged herself that only with great difficulty was she prevented from sinking.

In October, 1893, No. 137, while out for practice off Ile de Batz, experienced some mishap to her engines, which subsequently had to undergo large repairs.

Nos. 126–154 have Du Temple or Normand boilers. Some of them have exceeded 24 knots.

No. 145 did 24·7 knots at her trials; 146 did 24·26; 153 did 23·76; 154 did 23·15.

No. 171 did 24·38 knots for three consecutive hours at her trials, though only guaranteed to do 21 knots.

No. 177—the contract speed of which was 21 knots only—attained at her trials a mean speed of 22·8 knots for two hours, and a maximum speed of 23 knots with 309 revolutions.

All the more recent Normand boats have boilers fitted with tubes of two diameters, the larger being uppermost.

Of the nine 62·3 ft. boats (which are to be carried in the torpedo depôt ship Foudre), one of aluminium was built by Messrs. Yarrow, of Poplar.

The modern French boats have now to undergo quarterly six hours' trials. At each of these the craft has to be steamed for an hour at high speed, and to develop at least three-quarters of her maximum horse-power.

The submarine boat Morse is little more than a smaller Gustave Zédé. She will be completed by the end of 1894.

Germany.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DIVISION BOATS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
D 1, D 2 (2 boats)	Elbing ..	1887	185·3	21·6	9·8	2	250	1,800	21	6 1-pr. revs.	3	48	50
D 3, D 4 (2 boats)*	Elbing ..	1888	188	22	9·8	2	300	2,000	21	4 6-pr. Q.F. 2 1-pr. revs.	3	48	90
D 5, D 6 (2 boats)*	Elbing ..	1888–9	190	23·4	10·6	2	320	3,500	23	4 6-pr. Q.F. 2 1-pr. revs.	3	48	90
D 7, D 8 (2 boats)*	Elbing ..	1890	213	..	..	2	350	4,000	26	6 Q.F.	3		
D 9, D 10 (2 boats)*	Elbing ..	1891	..	..	..	2	380	..	26	6 Q.F.			
FIRST CLASS—													
S 1—S 64 (64 boats)	Elbing ..	1883–90	128 121·2	15·7 15·6	6·7 6·7	..	85–88	1,000	19–22	2 1-pr. revs.	2	..	17
S 65—S 74 (10 boats)	Elbing ..	1891–2	144·3	16·4	..	..	110	1,500	24	..	3		
S 75	Elbing ..	..	..	..	..	2	145	..	26	..	3		
S 76—S 80 (5 boats)	Elbing ..	1891–2	144·3	16·4	..	2	125	2,500	25	..	3		
S 81—S 96 (16 boats)	Elbing ..	1893–4	..	..	..	2	110–50	..	26	..			
8 boats	Elbing ..	1893–4	144·3	18	..	2	140	1,500	22	2 1-pr. revs.	3	..	32
V 1, V 2 (2 boats)	Stettin ..	1884	124·6	..	..	..	75	550	..	..	2		
V 3, V 4 (2 boats)	Stettin ..	1884	..	..	..	..	90	1,000	..	..	2		
V 5—V 10 (6 boats)	Stettin ..	1884	..	..	..	..			19	..	2		
G 1,	Gaarden ..	1885	124·6	15·7	6·6	..	88	1,000	19	2 1-pr. revs.	2	17	
Y 1,	Poplar ..	1884	120	12·5	5·5	1	65	650	19	2 1-pr. revs.	2	15	25
T 1, T 2 (2 boats)	Chiswick, &c.	1884	117·7	12·5	6·2	1	80	..	20·2	2 1-pr. revs.	2	15	22
H 1,	Kiel	1886	..	..	..	..	80	1,000	20	2 1-pr. revs.	2		
K 1,	Kiel (Dockyard)	1887	118·1	13·4	5·9	..	85	1,000	22	2 1-pr. revs.	..	18	
SECOND CLASS—													
W 3—W 6 (4 boats)	Bremen ..	1884	103	12·8	..	..	..	650	18·5	2 1-pr. revs.	2	14	13
3 boats	..	1893	..	..	..	..	88	..	22				
2 boats	..	1893	..	..	..	..	90	..	3				
VEDETTE BOATS—													
13 boats	..	..	..	..	..	..	13·5	..	18				
2 boats	..	..	..	..	..	..	..	..	16				
1 boat	Chiswick ..	1884	63	8	4·3	1	..	..	15·5	1 mach.	2		

* These boats also appear in Alphabetical List,

Greece.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
6 boats	Stettin ..	1885	128	15·3	5·4	1	85	1,050	19	4 1-pr. revs.	..	20	20
6 boats	Poplar.. ..	1881	100	12	4·2	1	48	600	19	2 1-pr. revs.	2	12	9
4 boats	La Seyne ..	1880	72	13	5·5	1	52	225	..	..	..	..	10
5 boats	La Seyne ..	1881	89	11	3·1	1	35	500	17·5	..	..	..	5
2 boats	Poplar.. ..	1878	75	10·8	2·5	..	18	295	16·2	..	..	..	1·5
7 boats	..	..	..	..	..	..	21	..	16				

Italy.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
5 boats	Elbing ..	1888	152	17·2	7·9	2	130	2,200	26·6	2 3-pr. Q.F., 1 1-pr. Q.F., 1 1-pr. rev.	3	24	40
Nos. 56–75 (20 boats)	Elbing and Italy ..	1885–87	127·7	15·6	6·8	1	65	1,000	22·5	2 1-pr. Q.F.	2	17	17
Nos. 76, 77 (2 boats)	Poplar.. ..	1887	140	14	5	2	100	1,600	25	2 3-pr. Q.F., 1 1-pr. rev.	5	20	30
Nos. 78, 79 (2 boats)	Venice ..	1887	135	14	5·3	2	110	1,600	24	1 1-pr. Q.F., 1 1-pr. rev.	5	20	30
Nos. 80–83 (4 boats)	Genoa	1888	101·6	..	..	1	34	430	21	1 1-pr. rev.	2	11	7
Nos. 84–104, 106–111 (27 boats)	Elbing and Italy ..	1887–88	127·7	15·6	6·8	1	85	1,000	22·5	2 1-pr. Q.F.	2	17	7
Nos. 112–135 (24 boats)	Elbing and Italy ..	1889–92	127·7	15·6	6·8	1	85	1,100 / 1,200	23	2 1-pr. Q.F.	2	17	17
Nos. 136–146 (11 boats)	Italy	1893–94	..	..	..	1	85	1,000	..	2 1-pr. Q.F.	2	17	17
8 boats	..	Bldg.	152	..	..	..	85	2,200	..	..	2		
SECOND CLASS—													
No. 22	Poplar.. ..	1881	100	12·5	5·5	1	40	620	22	1 1-pr. rev.	2	11	10
Nos. 23, 24 (2 boats)	Chiswick ..	1881	92	10·5	4·9	1	33	470	21·8	1 1-pr. rev.	2	11	7
No. 25	Poplar.. ..	1881	100	12·5	5·5	1	40	620	22	1 1-pr. rev.	2	11	10
Nos. 26–55 (30 boats)	Chiswick and Italy ..	1882–86	100	11·7	5·3	1	34	430	21·3	1 1-pr. rev.	2	11	7
THIRD CLASS—													
Veloce	Chiswick ..	1878	76	10	3·5	1	..	..	18	1 1-pr. rev.	..	10	
Nos. 1, 2 (2 boats)	Poplar.. ..	1879	86	11	4·5	1	25	420	21	..	..	10	7
Nos. 3–10, 16–21 (14 boats)	Chiswick ..	1883	63	7·5	2·5	1	13	170	16·5–17	1 1-pr. rev.	2	10	
No. 11	..	1883	..	..	..	1	31	250	..	..	..	10	
Nos. 12–15 (4 boats)	Chiswick ..	1883	66	..	3·8	1	16	250	19·2	1 1-pr. rev.	2	10	
SUBMARINE—													
Pullino	..	1893											

The five 152-ft. boats are named Aquila, Avvoltoio, Falco, Nibbio, and Sparviero.
The submarine boat Pullino, of which particulars have not been made public, was tried with success at Spezia in February, 1894.

Japan.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Kotaka	Poplar.. ..	1886	166	..	5	2	190	1,400	19	4 mach.	6	..	50
10 boats	Creusot ..	1889	114·7	10·6	6	1	56	525	20	2 1-prs.	..	16	
7 boats	Kobe	1889	114·7	10·6	6	1	56	525	20	2 1-prs.	..	16	
4 boats	Poplar.. ..	1879	100	12·5	..	1	40	620	20	..	..	..	3
1 boat	Normand ..	1891	118	13·2	8·7	2	75	1,300	23	2 1-prs.	2	21	10
16 boats	Onohama ..	1892–93	..	..	..	..	30						
2 boats	Elbing ..	1891	125	16	..	1	90	1,300	23	3 1-prs.	3	..	24

One of the above boats was lost off Yokohoma during the manœuvres of 1893.

Mexico.

Mexico has five first-class boats.

Netherlands.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Ardjoeno	Poplar.. ..	1886	125	13	6	1	83	800	21	2 1-prs.	2	16	10
Batok	Amsterdam	1887	125	13	6·9	1	83	725	20	2 1-prs.	2	16	10
Cycloop	Amsterdam	1887	125	13	6·9	1	83	680	20	2 1-prs.	2	16	10
Dempo	Amsterdam	1887	125	13	6·9	1	83	760	20	2 1-prs.	2	16	10
Empong	Poplar.. ..	1888	128	13	6·2	1	91	1,100	24·1	2 1-prs.	3	16	15
Etna	Poplar.. ..	1882	100	12	5·6	1	45	550	21·5	2 1-prs.	2	16	7
Foka	Amsterdam	1888	128	13	6·2	1	90	1,000	22·1	2 1-prs.	3		
Goentoer	Amsterdam	1888	128	13	6·2	1	90	950	21	2 1-prs.	3		
Habang	Amsterdam	1888	128	13	6·2	1	90	930	21·7	2 1-prs.	3		
Hekla	Poplar.. ..	1882	100	12	5·6	1	45	550	21·5	2 1-prs.	2	16	7
Idjen	Amsterdam	1889	128	13	6·2	1	90	840	20·6	2 1-prs.	3		
Krakatau	Amsterdam	1889	128	13	6·2	1	90	750	19·1	2 1-prs.	3		
Lamongan	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Makjan	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Nobo	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
SECOND CLASS—													
Nos. 1, 2, 4–20 (19 boats)	Chiswick, etc.	1878–86	76 / 79	10·3	5·2	1	29	250	18	1 1-pr.	2 sp	..	3
Nos. 3,21,22 (3 boats)	..	1890	83·6	10·5	5·1	1	37	460	17·9	1 1-pr.	1	..	3
1 boat	East Cowes	1883	45·5	9·7	..	1	..	..	12	1 mach.	1		
INDIAN FLEET—													
Cerberus	Flushing ..	1888	125	13	6·9	1	83	912	21·2	2-1 prs.	2	16	
1 boat	..	1891											
3 boats	..	1893–94	125	..	..	..	83	..	21·5	..	2		

Norway.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Lyn	..	1882	94·2	9·7	2·5	1	36	430	18	..	1	..	3
Od	..	1882	97·5	11	5·6	1	40	450	18	..	1	..	3
Orm, Otter (2 boats)	..	1887	108·2	12·2	5·6	1	40	500	20	..	2	..	3
Pil, Rask (2 boats)..	..	1887	101·7	11·8	5·6	1	40	500	20	..	2	..	3
Snar	..	1887	104·9	11·8	5·6	1	40	500	20	..	2	..	3
Springer	..	1887	97·5	11·6	5·6	1	40	450	19	..	2	..	3
SECOND CLASS—													
Rasp	Chiswick ..	1873	58	7·5	3·9	1	16	..	18	..	2		
Ulven	..	1878	56	..	..	1	16	..	9	..	sp.		

Portugal.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
5 boats (5–9)	Elbing ..	1890–92											
Espadarte (1)	Poplar.. ..	1881	86	11	5	1	31	450	19·7	2 mach.	2	10	10
Nos. 2, 3, 4 (3 boats)	Poplar.. ..	1886	120	12·5	5·5	1	60	700	20	2 mach.	2	16	18
Fulminante	Blackwall ..	1880	75	15	2·6	2	40	150	11·5	2 mach.	..	..	8
1 boat	..	..	..	..	..	..	25						
SUBMARINE—													
Plongeur	..	..	72·1	11·5	..	..	..	..	6				

Roumania.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Monteano	..	1893											
Naluka	Havre	1888	120·7	11·3	6·9	1	55	500	21	1 1-pr. rev	2	..	12
Olteano	..	1893	..	..	..	..	..	..	..	..	..	..	..
Sborul	Havre	1888	120·7	11·3	6·9	1	..	500	21	1 1-pr. rev.	2	..	12
Smeo	..	1893	..	..	..	..	..	..	..	..	..	..	..
Smeul	Havre	1888	120·7	11·3	6·9	1	..	500	21	1 1-pr. rev.	2	..	12
SECOND CLASS—													
Szimul	Poplar.. ..	1882	63	8	3	1	15	150	16·5	1 mach.	..	8	1
Vulturul	Poplar.. ..	1882	63	8	3	1	15	150	16·5	1 mach.	..	8	1

Russia.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
BALTIC SEA.													
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Abo	Elbing ..	1886	128	15·7	7·5	1	87	900	22·2	4 1-pr. revs.	2	13	17
Bjerke	Putiloff ..	1890	136·5	13	7·8	..	81	1,100	21				
Borgo	Abo	1890	136·5	13	7·8	..	81	1,100	21				
Dago	Abo	1891	152	13	8·3	..	100	1,000	19				
Eckness	Abo	1890	136·5	13	7·8	..	81	1,100	21				
Hapsal	Putiloff ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Hogland	Itschora ..	Bldg.	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Kotka	Abo	1891	152	13	8·3	..	100	1,000	19				
Kotlinj	St. Petersburg	1885	124·2	12·9	5·9	2	67	500	16·5	2 1-pr. revs.	2	16	15
Kronschlot	Kolpiro ..	1891	152	13	8·3	..	100	1,000	19				
Lachta	Elbing ..	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Libawa	Elbing ..	1886	128	15·7	7·5	1	87	1,000	22	4 1-pr. revs.	2	13	17
Louga	Elbing ..	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Moonsund	Putiloff ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Nargen	Itschora ..	Bldg.	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Narwa	Elbing ..	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Pernow	Normand ..	1892	138	14·7	9·9	2	118	..	25·4	2 mach.	2	26	
Revel	Normand ..	1886	152·3	12·3	8·1	1	96	780	22	2 Q.F.	..	..	30
Rochensalm	Putiloff ..	1890	136·5	13	7·8	..	81	1,100	21				
Seskar	Kolpiro ..	1891	152	13	8·3	..	100	1,000	19				
Sestoresk	Normand ..	1893	118	13·2	8·7	2	75	1,300	24	2 1-prs.	2	21	10
Sweaborg	Normand ..	1886	152·3	12·3	8·1	1	96	780	19·7	2 Q.F.	..	..	30
Tosna	Putiloff ..	1893	127·9	15·7	6·9	1	..	1,250	21	..	2	13	17
Viborg	Clydebank ..	1886	144·5	17	8·1	2	126	1,400	20	2 3-pr. revs.	3	24	45
Vindawa	Elbing ..	1886	128	15·7	7·5	1	87	900	21	4 1-pr. revs.	2	13	17
Vzriw	St. Petersburg	1877	118	16	10·9	1	160	800	14·5	4 Q.F.	1	18	16
N.	Elbing ..	1893	152	17									
8 boats	St. Petersburg	Bldg.	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
2 boats	Putiloff ..	Bldg.	138	14·7	9·9	2	118	..	25	2 mach.	2	26	
10 boats	St. Petersburg	Pr.	150	..	..	..	..	..	26·2				
SECOND CLASS—													
21 boats (Galka class)	Elbing and Russia ..	1880 &c.	74·7	8·9	5	1	30	220	16	..	2	14	3
21 boats (Woron class)	Elbing and Russia ..	..	66	11·1	..	1	..	260	17				
1 boat	Poplar.. ..	1888	60	8·5	3	1	16	240	17·5	..	2	..	1
BLACK SEA.													
FIRST CLASS—													
A. B. C. (3 boats) ..	Nicolaieff ..	1893	126	..	..	..	81	..	21				
Adler..	Elbing ..	1890	152·0	17·2	7·9	2	130	2,200	27·4	2 1-prs.	3	24	40
Anakria	Elbing ..	1890	128·0	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Anapa	Odessa.. ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Aitodorj	Odessa.. ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Batoum	Poplar.. ..	1880	100	12·5	5·5	1	40	500	22	2 1-pr. revs.	2	12	9
D. E. (2 boats) ..	Sebastopol ..	1893	128	..	..	..	85	..	22				
Gagri	Claparède ..	1883	120·6	13·3	7	1	78	600	18	2 1-pr. revs.	2	13	12
Gelendshik	La Seyne ..	1883	122·7	12·4	6·2	1	73	560	18	2 1-pr. revs.	2	13	11
Ismail	Nicolaieff ..	1886	128	15·7	7·5	1	87	900	20	2 1-pr. revs.	2	13	17
Itzvar	Odessa.. ..	1891	..	..	..	..	81	1,100					
Kodor	Elbing ..	1886	128	15·7	7·5	1	87	900	21	4 1-pr. revs.	2	13	17
Kilia	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
Novorossisk	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
Poti	Normand ..	1883	124·6	11·9	6·7	1	72	570	18·5	2 1-pr. revs.	2	13	11
Reni	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
Sookhoum	Chiswick ..	1883	113	12·5	6	1	64	700	19.5	2 Nords.	2	13	10
Tchardak	Elbing ..	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Yalta..	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
SECOND CLASS—													
Istcheritza	Sebastopol ..	1878	62·3	9·7	3·9	1	24	220	15	..	..	10	
Karabin	Elbing.. ..	1877	64·3	8·4	2	1	11	120	15	..	..	8	
Kefal..	Chiswick ..	1880	60·5	7·5	3·5	1	..	..	16·8	..	..	8	
Scheglensk	Sebastopol ..	1878	59·3	9·5	3·9	1	24	220	15	..	..	10	
Schehouka	Sebastopol ..	1878	59·3	9·5	3·9	1	24	220	15	..	..	10	
Scoombia	Odessa.. ..	1878	64·3	10	4	1	25	220	15	..	..	10	
Soroka	St. Petersburg	1878	62·3	9·7	3·9	1	24	220	15	..	..	10	
Soulin	..	1877	60	9·7	3·9	1	24	210	15	..	..	10	
Sultanka	Odessa.. ..	1878	64·3	10	4	1	25	220	15	..	..	10	
50 boats (Woron Class)	Elbing, etc.	..	66	11·1	..	1	..	260	17				

Russia—*continued.*

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
SIBERIAN FLOTILLA.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
Forel..	..	..	71·5	6·5	3·3	1	23	220	16				
Jantchiche	Elbing.. ..	1887	128	15·7	11·5	..	87	970	19	4 1-pr. revs.	2	13	17
N.	..	1893	152·5	16·8	..	..	140	2,200	26·5	2 1-pr. revs.	3	24	40
N.	..	1893	152·5	16·8	..	..	140	2,200	26·5	2 1-pr. revs.	3	24	40
Podorosnik	..	..	71·5	6·5	3·3	1	23	220	16				
Sisik	..	..	71·5	6·5	3·3	1	23	220	16				
Skorpion	..	..	71·5	6·5	3·3	1	23	220	16				
Sootchena..	Elbing.. ..	1887	128	15·7	11·5	..	87	970	19	4 1-pr. revs.	2	13	17
Sterliad	..	..	71·5	6·5	3·3	1	23	220	16				
Strauss	..	..	71·5	6·5	3·3	1	23	220	16				
Sunguri (*ex* Hogland)	Abo	1890	152	16	7·9	2	104	1,800	22				
Ussuri (*ex* Nargen)	Abo	1890	152	16	7·9	2	104	1,800	22				

Among the names given or to be given to the new 128-ft. boats for the Baltic Fleet are Aspe, Doreness, and Transund.

All the building yards, public and private, at Cronstadt and St. Petersburg are now being provided with plant for the construction of torpedo-boats, the Government desiring to be no longer obliged to order any of these craft abroad.

The Tosna has triple-expansion engines with cylinders of 16·5, 24·8, and 24·8 in. diameter, respectively, and 16 in. stroke. Steam is supplied by two Du Temple boilers.

Spain.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
A.	..	1893	147·5	14·6	..	2	97	1,600	25	3 3-prs.	2	..	25
Acevedo	Chiswick ..	1885	117·7	12·5	6·2	1	63	660	20·6	2 mach.	2		
Ariete	Chiswick ..	1887	147·5	14·6	4·9	2	97	1,600	26·1	4 3-pr. Q.F.	2	..	25
Azor	Poplar.. ..	1887	134·5	14	6	1	108	1,600	24	4 3-pr. Q.F.	3	23	25
B.	..	1893	135	14	6	1	105	1,600	24	4 3-prs.	3	23	25
Barcelo	Normand ..	1886	126	10·9	..	..	66	800	19·5	2 1-in. Nord.	2		
Bustamente	Normand ..	1887	126	10·9	..	..	63	800	..	3 3-prs.	2		
C.	..	Bldg.	147·5	14·6	..	2	97	1,600	25	3 3-prs.	2	..	25
D.	..	Bldg.	147·5	14·6	..	2	97	1,600	25	3 3-prs.	2	..	25
Ejercito	Kiel	1887	111·5	13	3·3	..	60	1,000	25	2 mach.	2		
Habana	Chiswick ..	1887	127·5	12·5	6	1	59	730	21·2	1 mach.	2		
Halcon	Poplar.. ..	1887	134·5	14	..	1	108	1,600	24	4 3-pr. Q.F.	3	23	25
Julian Ordoñez ..	Chiswick ..	1885	117·7	12·5	6·2	1	65	660	20·5	2 1-in. Nord.	2		
Orion..	Gaarden ..	..	125	15·5	3·5	1	85	1,000	21·5	2 1-pr. revs.	2	18	16
Rayo..	Chiswick ..	1887	147·5	14·6	4·9	2	97	1,600	25·5	4 3-pr. Q.F.	2	..	25
Retamosa..	Poplar.. ..	1886	118	12·5	5·5	1	70	700	20·5	2 1-in.	2	17	20
Rigel..	Bremen ..	1883	105	12·3	3·3	1	57	..	19	1 1-pr. rev.	2	18	13
Seza	Ferrol.. ..	1885	126	..	..	..	85	..	14				
20 boats	..	{1893 & Bldg}	..	..	..	..	60						
SECOND CLASS—													
Aire	Spain	1883	43·4	10·2	3	2	25	175	8	1 3·1-in.	..	16	1
Castor	La Seyne ..	1878	76·2	9·7	2·3	..	23	265	19	..	..	14	1·5
Pollux	Poplar.. ..	1879	84·5	10·7	4·6	..	33	450	19·5	..	2	14	9
VEDETTE BOATS—													
3 boats	East Cowes	1892	60	9·3	..	..	..	..	18·3				
Peral..	Carraca ..	1889	70	8·5	..	2	87	60	10				

Sweden.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
3 boats	Stockholm ..	1886	114·4	12·4	6·4	1	60	600	18	1 mach.	2	12	15
Hugin (1)	Chiswick ..	1884	113	12·5	6·2	1	65	620	19·2	1 mach.	2	12	11
Nos. 9 (Gondul), 11 (Gudur)	..	1893	..	..	..	..	..	..	..	2 mach.	2		
1 boat	..	Bldg.											
10 boats	..	Pr.											
SECOND CLASS—													
Agda (77)	Carlskrona ..	1891	100·4	11·3	5·8	1	40	450	19	1 mach.	2	12	7·5
Agne (75)	Stockholm ..	1891	100·4	11·3	5·8	1	40	450	19	1 mach.	2	12	7·5
Blink (61)	Stockholm ..	1882	91·5	11·7	5·2	1	34	350	16	..	1	10	8
Blixt (63)	..	1883	100·4	11·6	5·4	1	40	360	18	..	2	12	7
Bygve (71)	Stockholm ..	1889	103·2	11·6	5·8	1	41	360	18	..	2	12	9
Bylgia (73)	Stockholm ..	1889	103·2	11·6	5·8	1	41	360	18	..	2	12	9
Galdr (65)	Stockholm ..	1885	100·4	11·6	5·4	1	40	425	18·5	..	2	12	7·5
Narf (67)	Stockholm ..	1886	101·2	11·6	5·7	1	40	450	19	..	2	12	7·5
Nörve (69)	Stockholm ..	1886	101·2	11·6	5·7	1	40	450	19	..	2	12	7·5
Rolf	Stockholm ..	1882	91·5	11·7	5·2	1	34	390	17	..	1	10	8
Seid	Chiswick ..	1882	100	12	5	1	40	360	20·7	1 mach.	2	12	8
6 boats	..	Pr.											
THIRD CLASS—													
Nos. 141, 143, 145, 147, 149, 151 (6 boats)	Stockholm ..	1879–90	55	10·7	4·1	2	21	80	10	..	2	..	1·5
Glimt (101)	Chiswick	1875	58	7·6	3	1	5	60	18	..	2	..	1·5

The three 114·4-ft. boats are named Freka, Gere, and Munin.

Turkey.

Name or Number.	Where Built, or by Whom.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
1 boat	Gaarden ..	1890	187	21·6	..	2	230	2,000	20	6 1-pr. revs.	2		
Edjder (No. 10) ..	Gaarden ..	1890	152·7	18·9	7·4	2	150	2,200	23	5 3-prs. Q.F.	2		
1 boat	Constantinople	1889	140	16	6·9	2	120	1,800	23	5 1-pr. revs.	2		
5 boats	Gaarden ..	1889–90	126·7	15·4	8·6	1	85	1,300	22	2 1-pr. revs.	2	21	8
Timsah	London ..	1887	126	15	..	..	..	..	21·7				
5 boats	Elbing ..	1886–89	120·3	16·2	..	..	85	1,000	21	2 Nords.	2	20	10
4 boats	Constantinople	1886–89	100·3	11·8	5·5	1	42	550	19·5	2 mach.			
Tewfik	Normand ..	1885	100·7	13	5·5	1	42	550	20				
2 boats	La Seyne ..	1885	100·7	13	5·5	1	42	550	20·3	2 Nords.			
10 boats	Elbing ..	1890 & Bldg.											
SUBMARINE—													
Abdul Hamid	Chertsey ..	1886	100	12	..	3	160	250	10	2 mach.	1	..	8
Abdul Medjid	Chertsey ..	1886	100	12	..	3	160	250	10	2 mach.	1	..	8

United States.

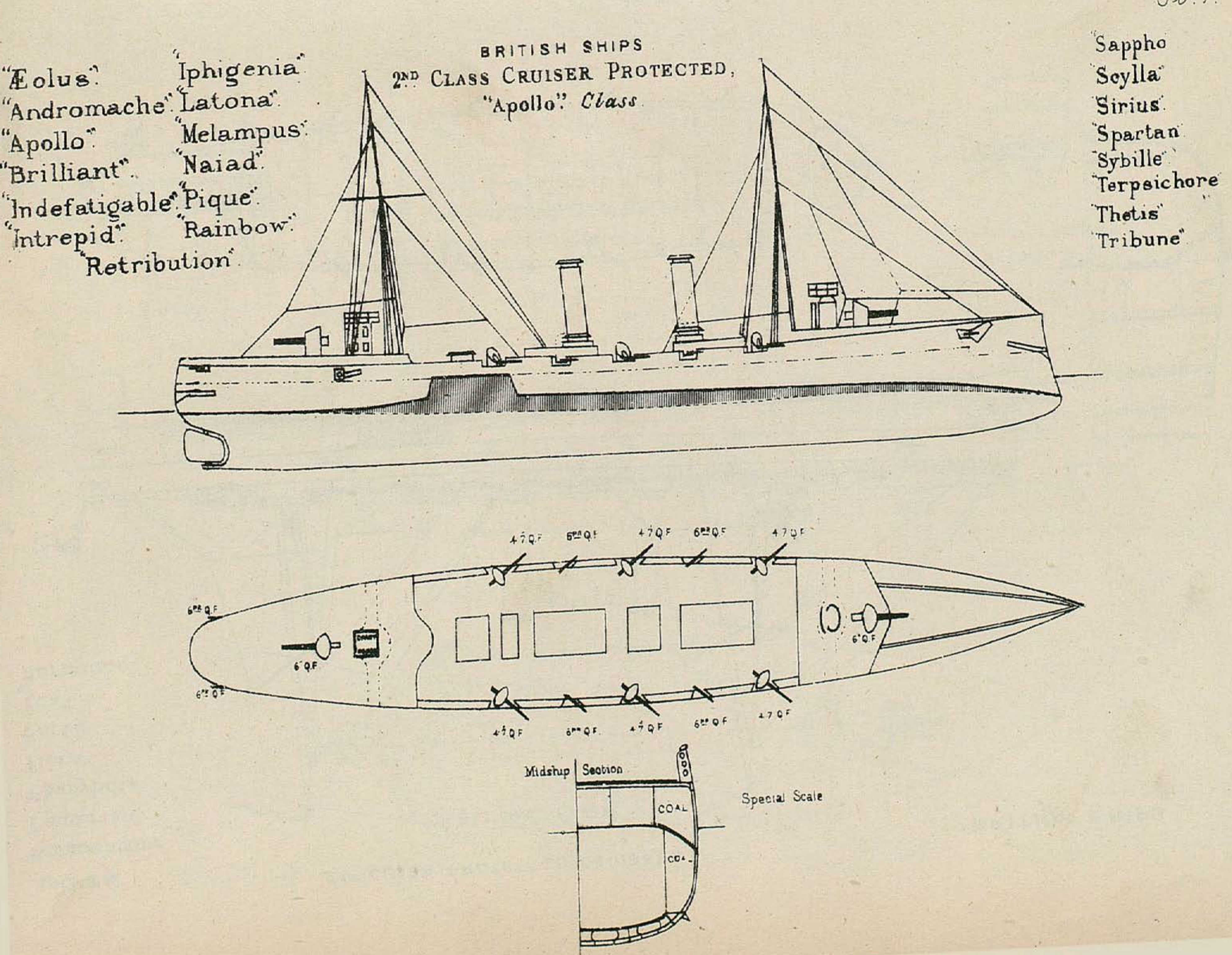
Name or Number.	Where Built, or by Whom.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
Cushing	Bristol, R.I.	1890	138·9	14·1	5·3	2	116	1,720	22·5	2 3-pr. Q.F.	3	21	
No. 2..	Dubuque, I.	1892	150	15·6	4·9	2	120	2,500	24	4 3-pr. Q.F.	3	21	
SECOND CLASS—													
Stiletto	Bristol, R.I.	1886	88·6	11	3	1	30	350	18·2	..	2	..	5
VEDETTE BOATS—													
2 boats	..	Bldg.	61·7	9	..	1	14·8	..	18	1 1-pr.	1		
2 boats	..	Bldg.	50	9	..	1	12·1	..	17	1 1-pr.	1		
SUBMARINE—													
1 boat	New York	Pr.	82	..	..	..	150	1,000					

The two 61·7-ft. boats are to be carried on board the Maine. Each will have a bow tube for an 18-in. Whitehead. The engines will be quadruple-expansion. The boilers will work at a pressure of 250 lbs. Of these boats, when fully ready for action, the metacentric height is estimated at 1·55 ft., and the vanishing angle at 89°.

The two 50-ft. boats are to be carried on board the Texas. Each will have a revolving tube for an 18-in. Whitehead. The engines and boilers will be as in the 61·7-ft. boats, but the speed will be only 17 knots. The metacentric height will be 1·5 ft., and the vanishing angle 73°.

Great attention has been devoted in the United States during the past year to the subject of submarine navigation. The most promising designs for submarine boats are those of Mr. Holland and Mr. Baker. Each of these boats has the form of an elongated egg of about 150 tons displacement. Each has within herself boiler, engine, batteries, dynamo and accumulators. Each, when at the surface, will be propelled in the usual way by steam. Each, when submerged, will be propelled by electricity. Each is provided with reservoirs of compressed air. In the Holland boat, immersion and horizontal direction are controlled automatically. The horizontal control is provided by means of a horizontal rudder, worked by an apparatus similar to that which regulates the horizontal direction of the Whitehead. A vertical rudder may also be connected with an automatic guide in such a manner as to ensure the movement of the boat in a straight line when submerged. The hull in the original specification was designed to resist a pressure of 65 ft. of water, but the Government Board to which the plans were submitted deemed that such a boat ought to be able to resi-t a pressure of 150 ft. of water. The Baker boat is designed to resist that pressure. It possesses no automatic steering machinery, and its movements in all planes are governed by means of screws. Another design which has received some attention is that of Mr. Schwann. In this ca-e every movement of the boat is effected by means of pumps acting against the surrounding water; but as these pumps are to be driven by a petroleum engine, the plan is considered to be a dangerous one. The Schwann boat, however, includes one very original feature. It contains provision for obtaining supplies of fresh air from the water itself. The boat which was ordered by the American Government in 1893 is understood to combine some features of both the Baker and the Holland boats. She is designed to do 16 knots when on the surface (this by steam), and 8 knots when submerged (this by electricity); but her construction is apparently deferred for the present.

WM. LAIRD CLOWES.


BRITISH SHIPS
2ND CLASS CRUISER PROTECTED,
"Apollo." Class
"Æolus."
"Andromache."
"Apollo."
"Brilliant".
"Indefatigable".
"Intrepid".
"Iphigenia".
"Latona".
"Melampus".
"Naiad".
"Pique".
"Rainbow".
"Retribution".
"Sappho
"Scylla"
"Sirius".
"Spartan"
"Sybille"
"Terpsichore
"Thetis"
"Tribune"
4.7 Q.F
6PR Q.F
4.7 Q.F
6PR Q.F
4.7 Q.F
6PR Q.F
6" Q.F
6PR Q.F
6" Q.F
4.7 Q.F
6PR Q.F
4.7 Q.F
6PR Q.F
4.7 Q.F
Midship Section
COAL
COAL
Special Scale

"Astræa"
"Bonaventure"
"Cambrian"
"Charybdis"
"Flora"
"Forte"
"Fox"
"Hermione"

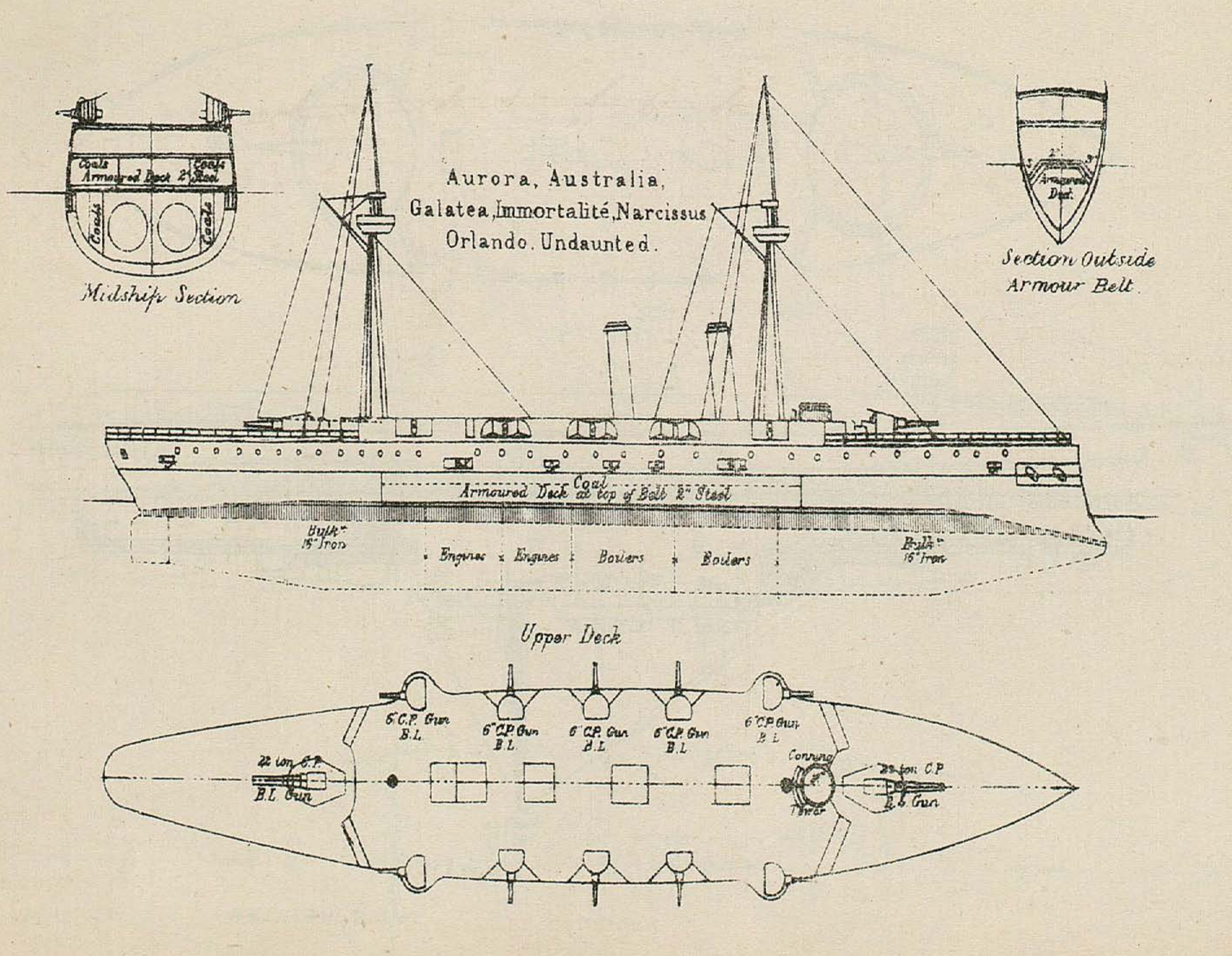
"Astræa" (Class)

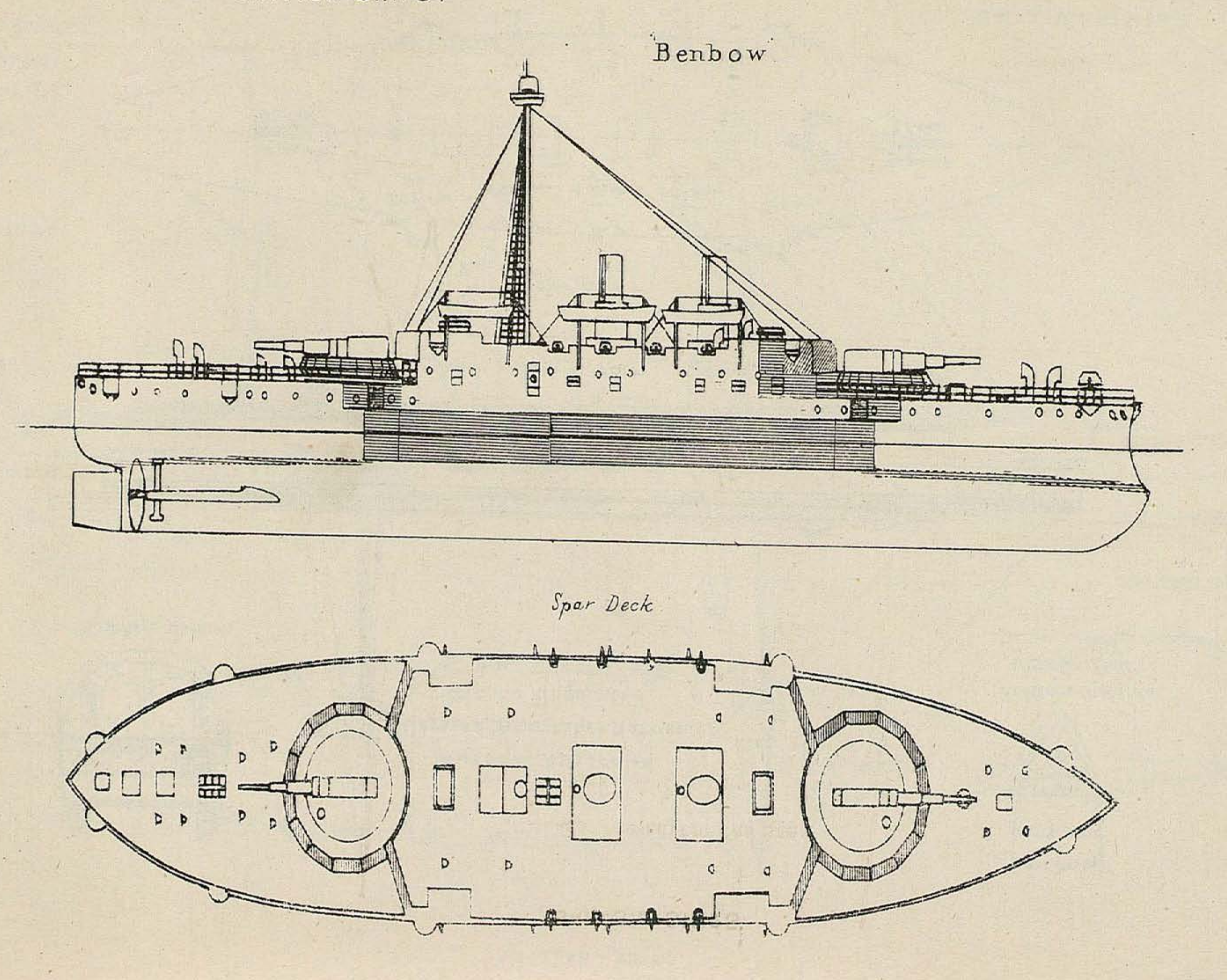
On Special Scale

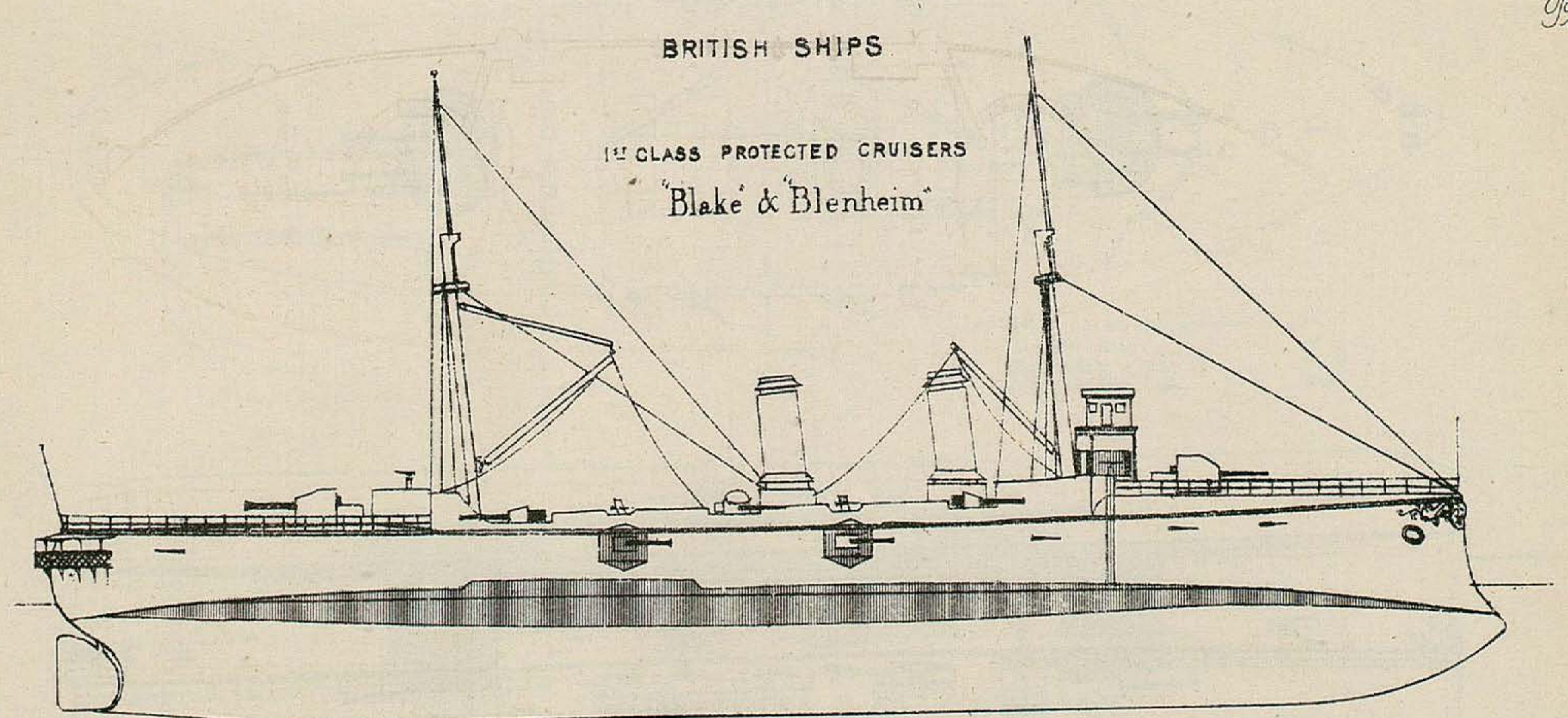
MIDSHIP SECTION

Coals

Coals


Aurora, Australia,
Galatea, Immortalité, Narcissus
Orlando. Undaunted.
Coals
Armoured Deck 2" Steel
Coals
Coals
Midship Section
Armoured Deck
Section Outside Armour Belt.
Coal
Armoured Deck at top of Belt 2" Steel
Bulk.hd 15" Iron
Engines
Engines
Boilers
Boilers
Bulk.hd 15" Iron
Upper Deck
6" C.P. Gun B.L.
6" C.P. Gun B.L.
6" C.P. Gun B.L.
6" C.P. Gun B.L.
6" C.P. Gun B.L.
22 ton C.P. B.L. Gun
Conning Tower
22 ton C.P. B.L. Gun


Benbow
Spar Deck


BRITISH SHIPS
1st CLASS PROTECTED CRUISERS
"Blake" & "Blenheim"

BRITISH SHIPS.

SECOND CLASS BATTLE SHIPS

"Centurion" & "Barfleur"

H.M.S "Collingwood".

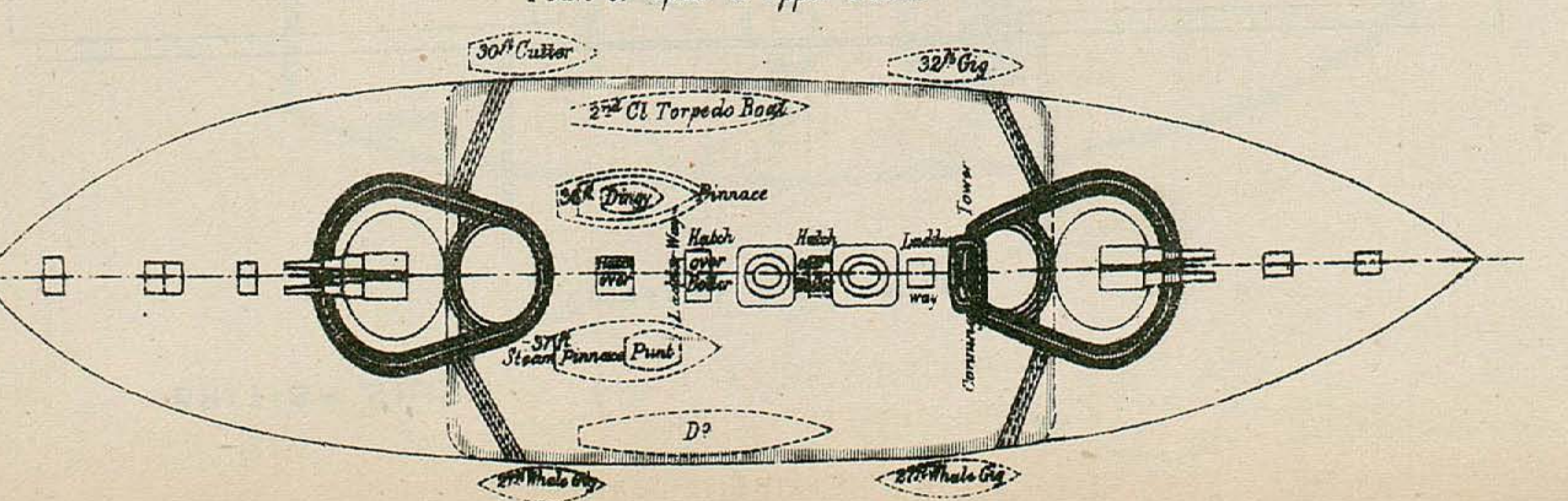
ALSO ON SLIGHTLY DIFFERENT DIMENSIONS

"Howe", "Rodney", "Anson" & "Camperdown".

Length between the Perpendicular	325 0
Breadth extreme	68 0
Displacement in Tons	9150
Indicated Horse Power	7000

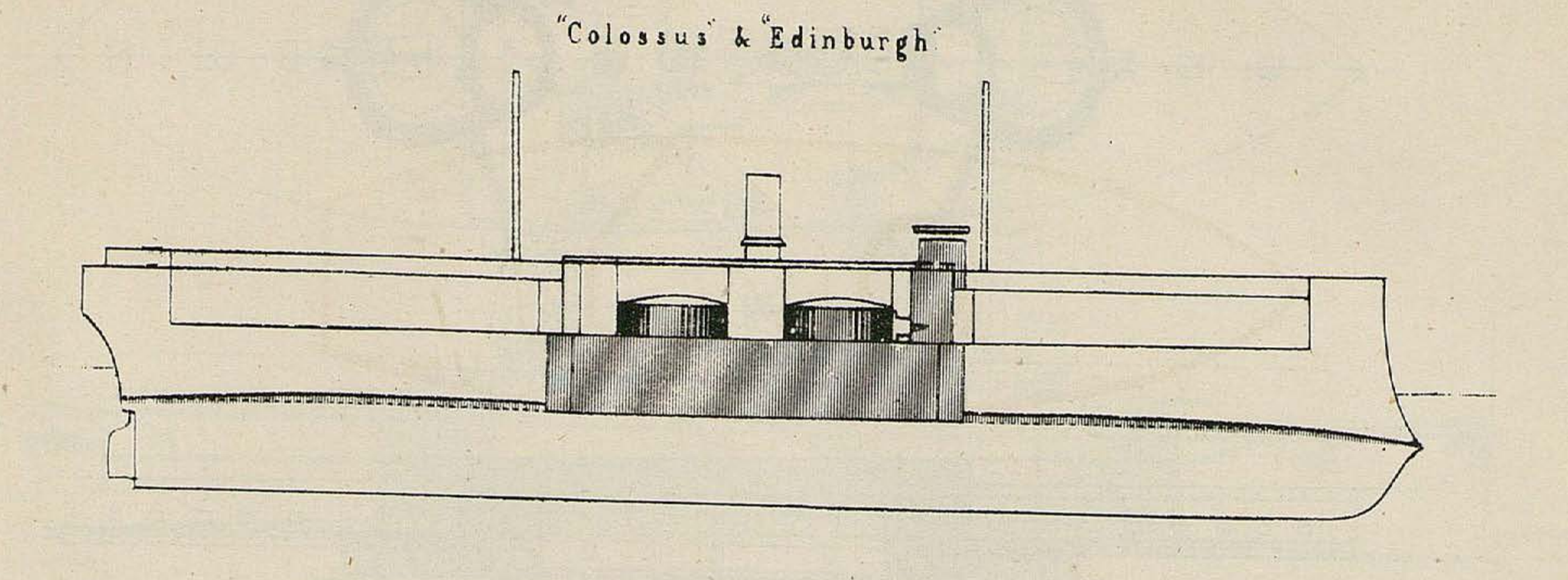
Midship Section

Plan of Spar & Upper Decks



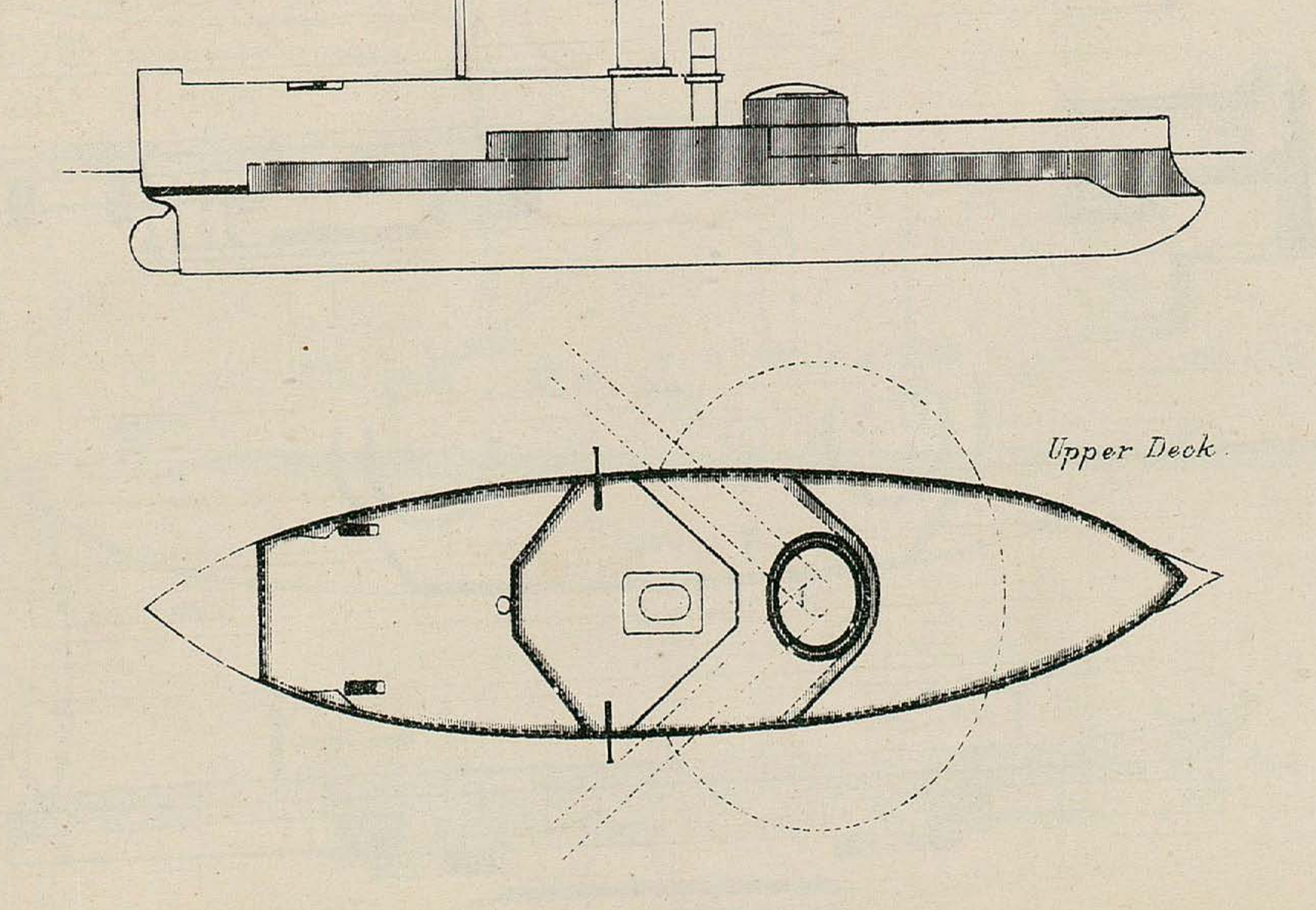
BRITISH SHIPS.

"Colossus" & "Edinburgh"



BRITISH SHIPS

"Conqueror" & "Hero"



"Dreadnought"

14 in
11 in
14 in
Powder
Coals
Engines
Boilers
Boilers
Coals
Powder
Cables

Upper Deck
144 ft 4 in
320 ft
31 ft 10 in
184 ft

"Glatton"

12 in
12 in
245 ft

Upper Deck
120 ft

Dreadnought
7 in + 7 in
Section in way of Turret.
14 in
Coals

Glatton
8 in + 6 in
Section in way of Turret
12 in
12 in

HANHART LITH

BRITISH SHIPS

FIRST CLASS PROTECTED CRUISERS

"Edgar" Class

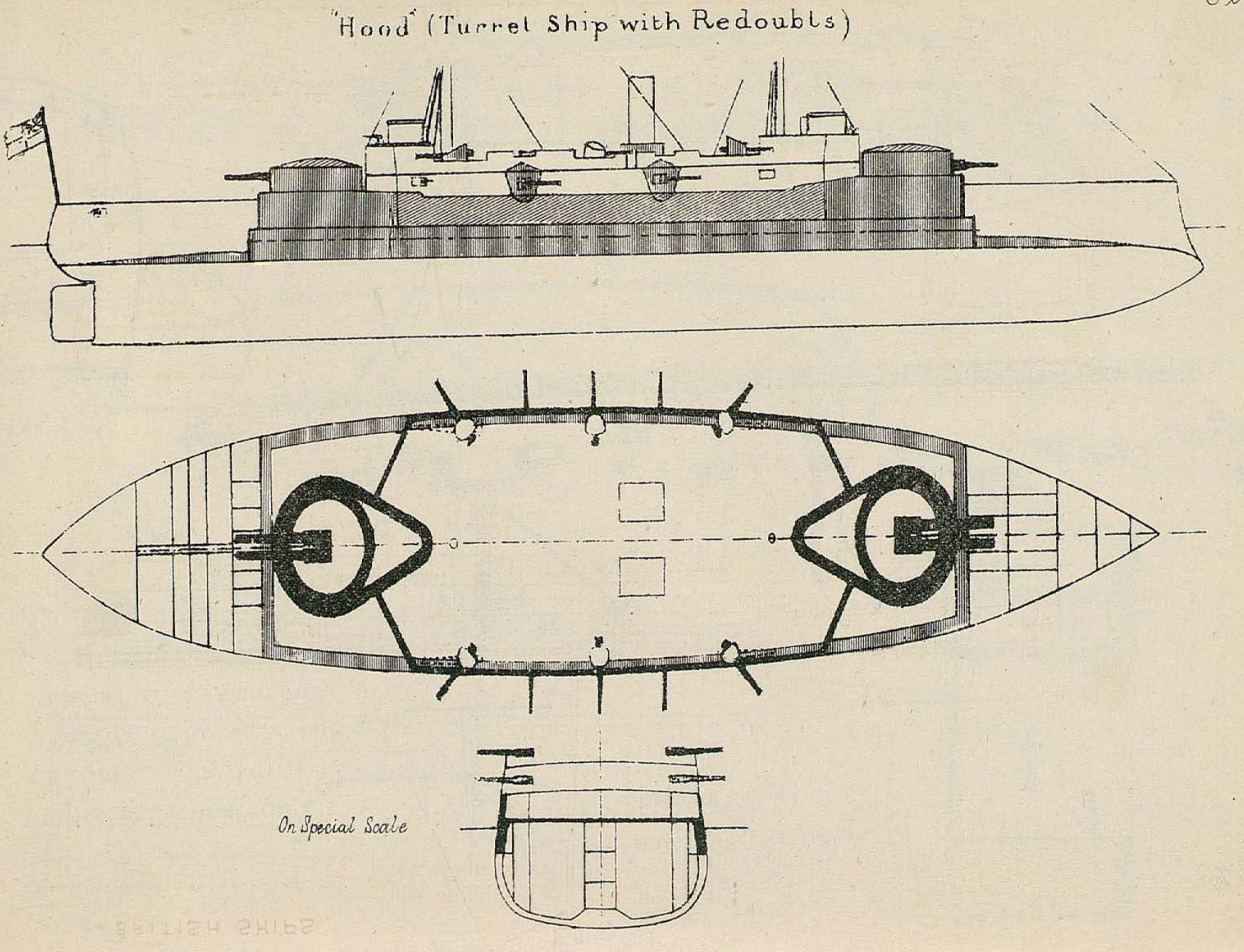
"Crescent". "Grafton".
"Edgar". "Hawke".
"Endymion". "Royal Arthur".
"Gibraltar". "St George".
"Theseus".

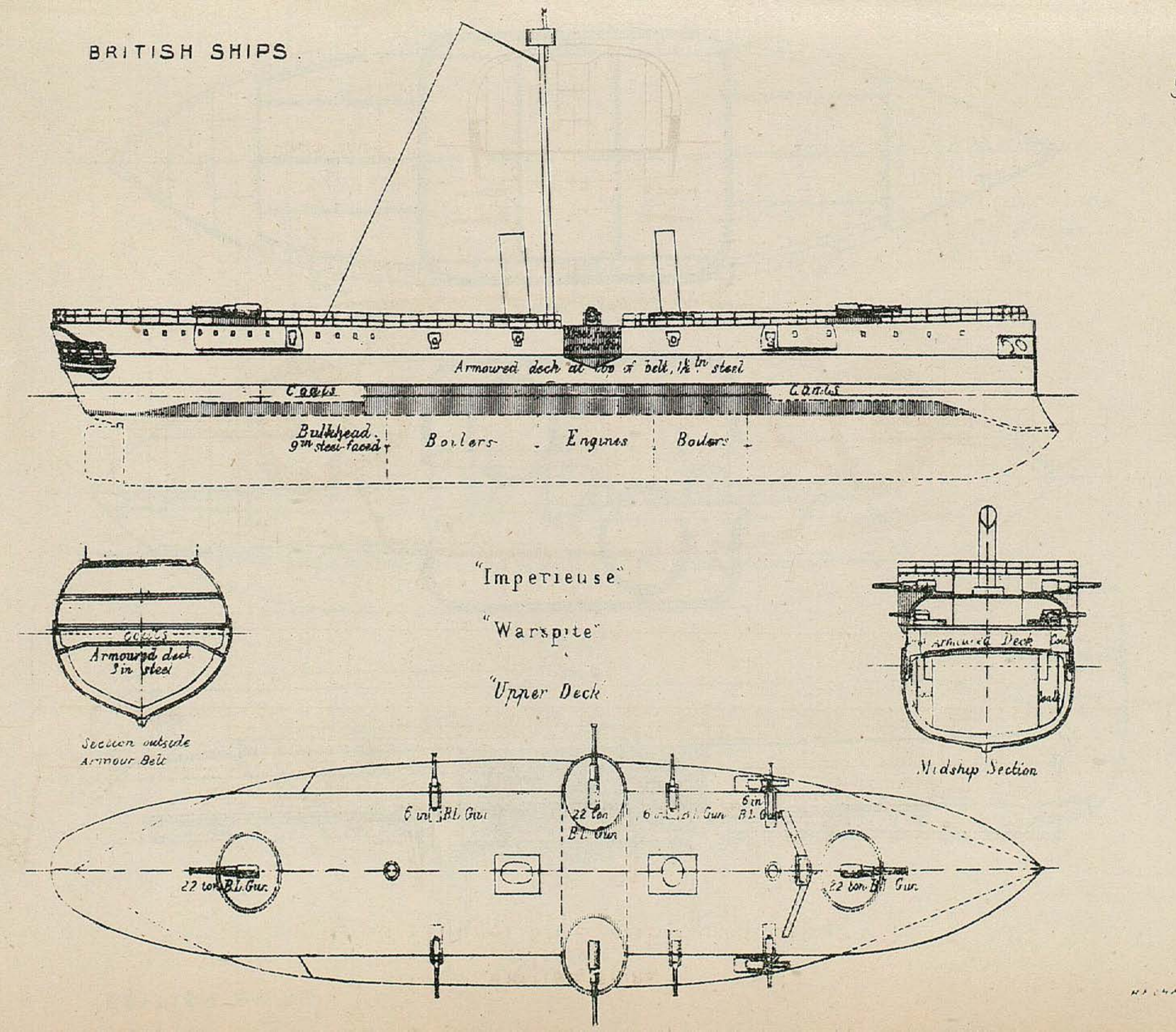
MIDSHIP SECTION
On Special Scale

PASSAGE
COAL
COAL
WING

UPPER DECK

"Hood" (Turret Ship with Redoubts)





"Imperieuse"

"Warspite"

"Upper Deck"

"Inflexible"

380 ft

Upper Deck

Lower Deck

Cork

Coal

Cork

Coals

Coals

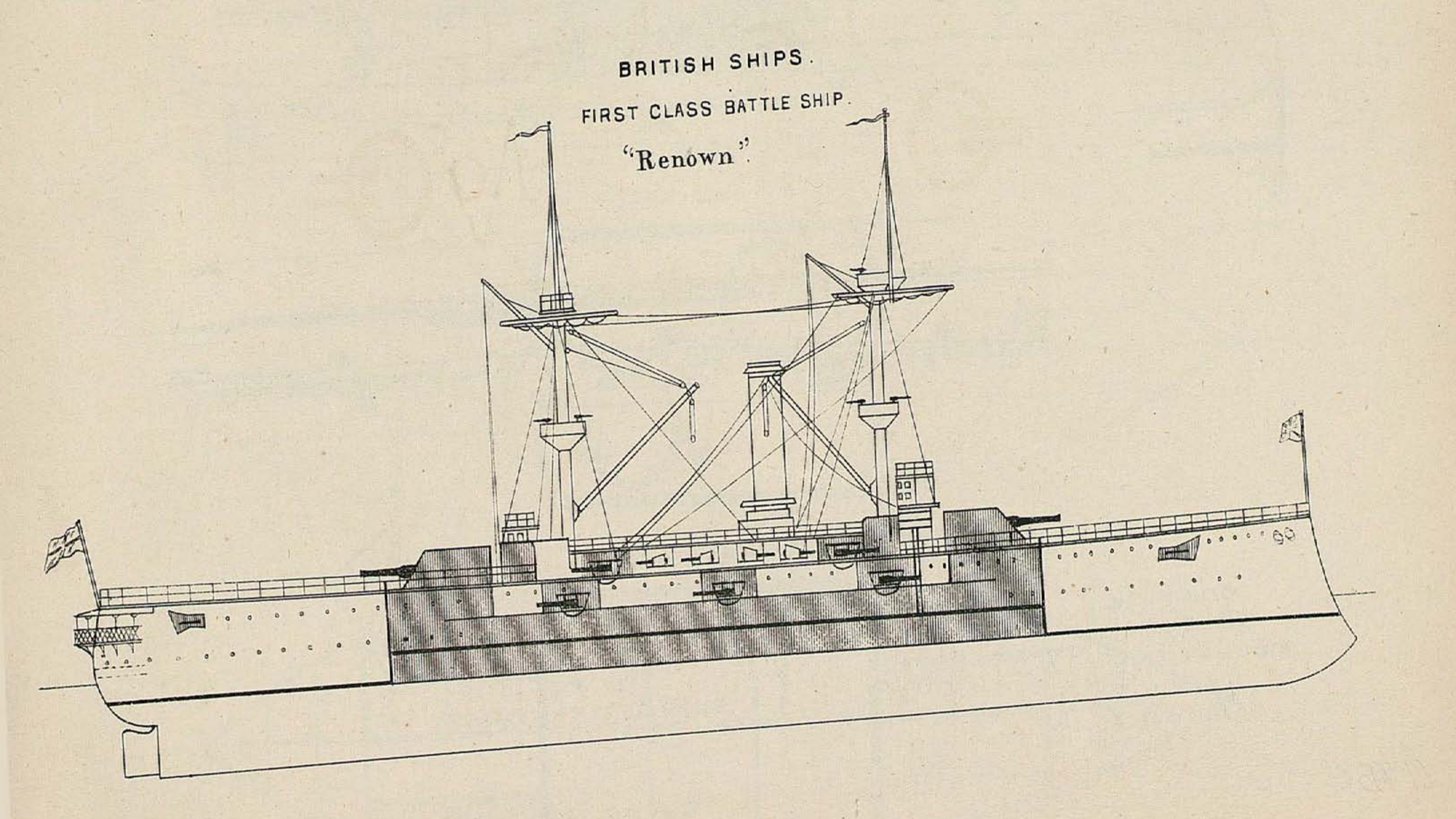
Cables

Coal

AUSTRALIAN CRUISERS
"Katoomba" Class

Vessels of "Katoomba" class
- "Katoomba"
- "Mildura"
- "Ringarooma"
- "Tauranga"
- "Wallaroo"

On Special Scale



BRITISH SHIPS.

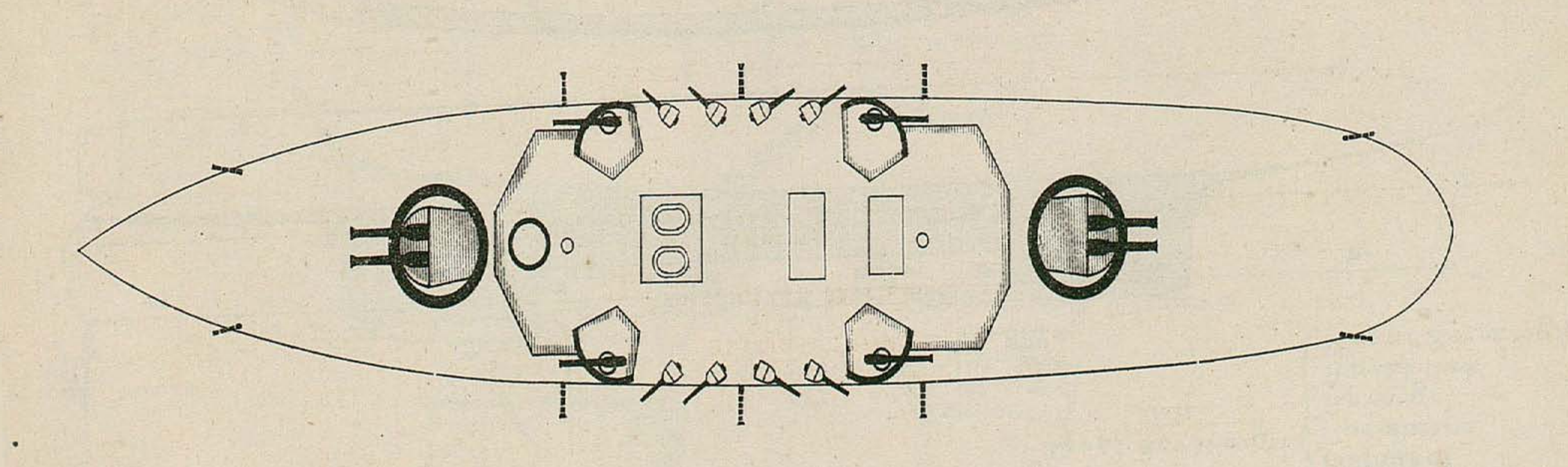
FIRST CLASS BATTLE SHIP.

"Renown".

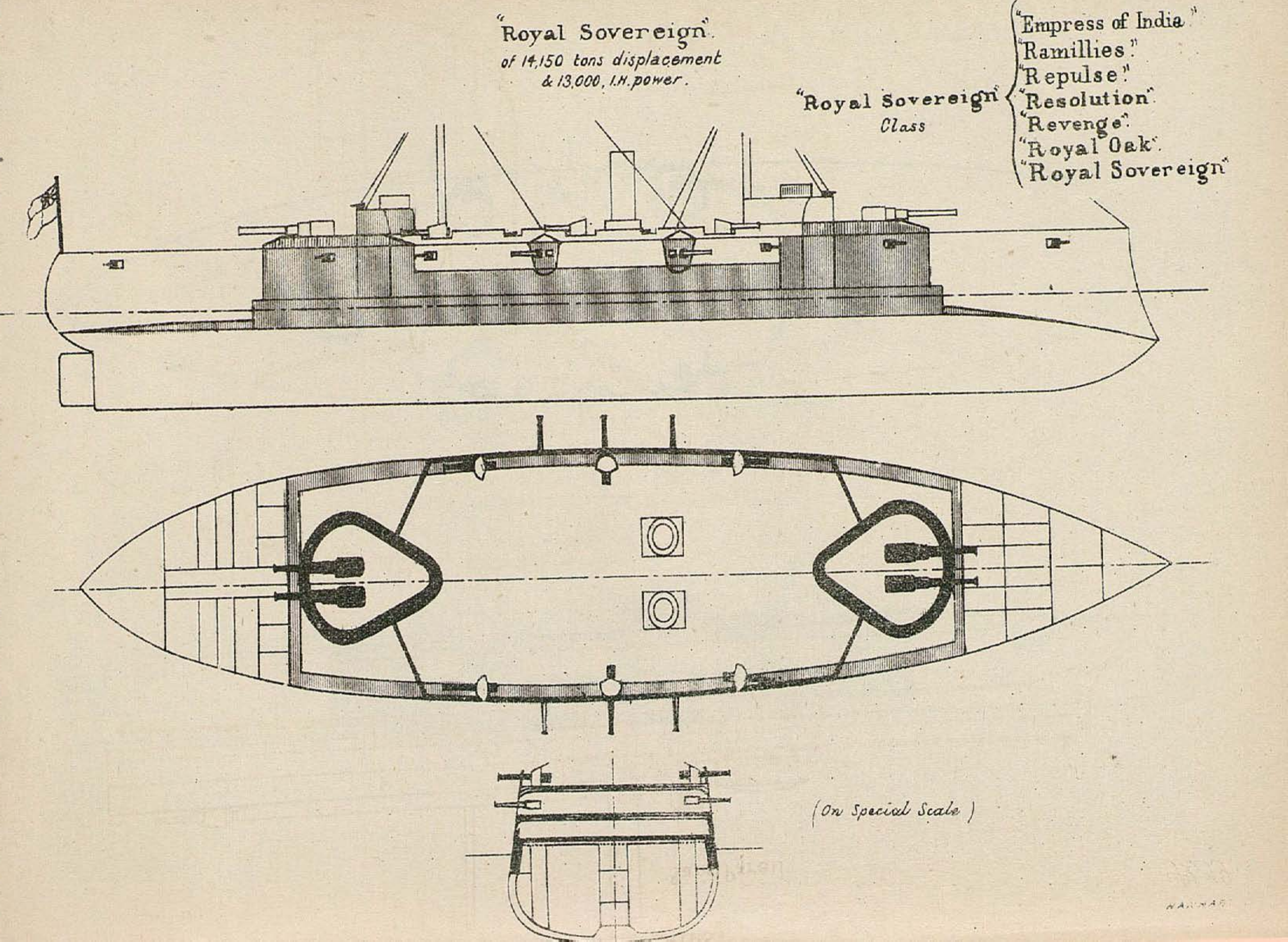
BRITISH SHIPS.

FIRST CLASS BATTLE SHIP.

"Renown".



BRITISH SHIPS.



Pl. 19.

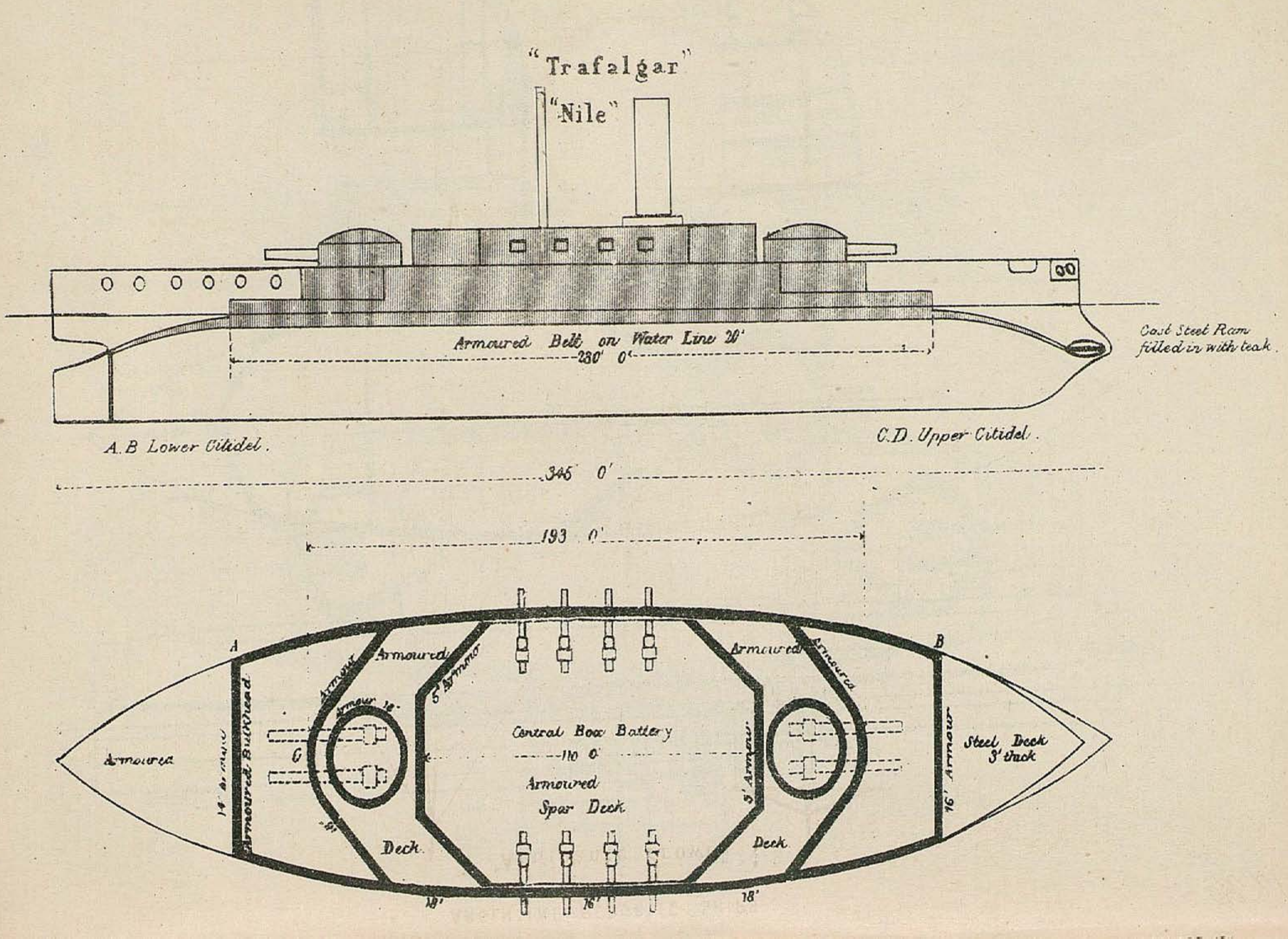
"Sans Pareil"

Spar Deck
Upper Deck
Machinery Space

Midship Section

Upper Deck
Crew Space
Main Deck
Coal
Armour Deck
Coal
W.T.

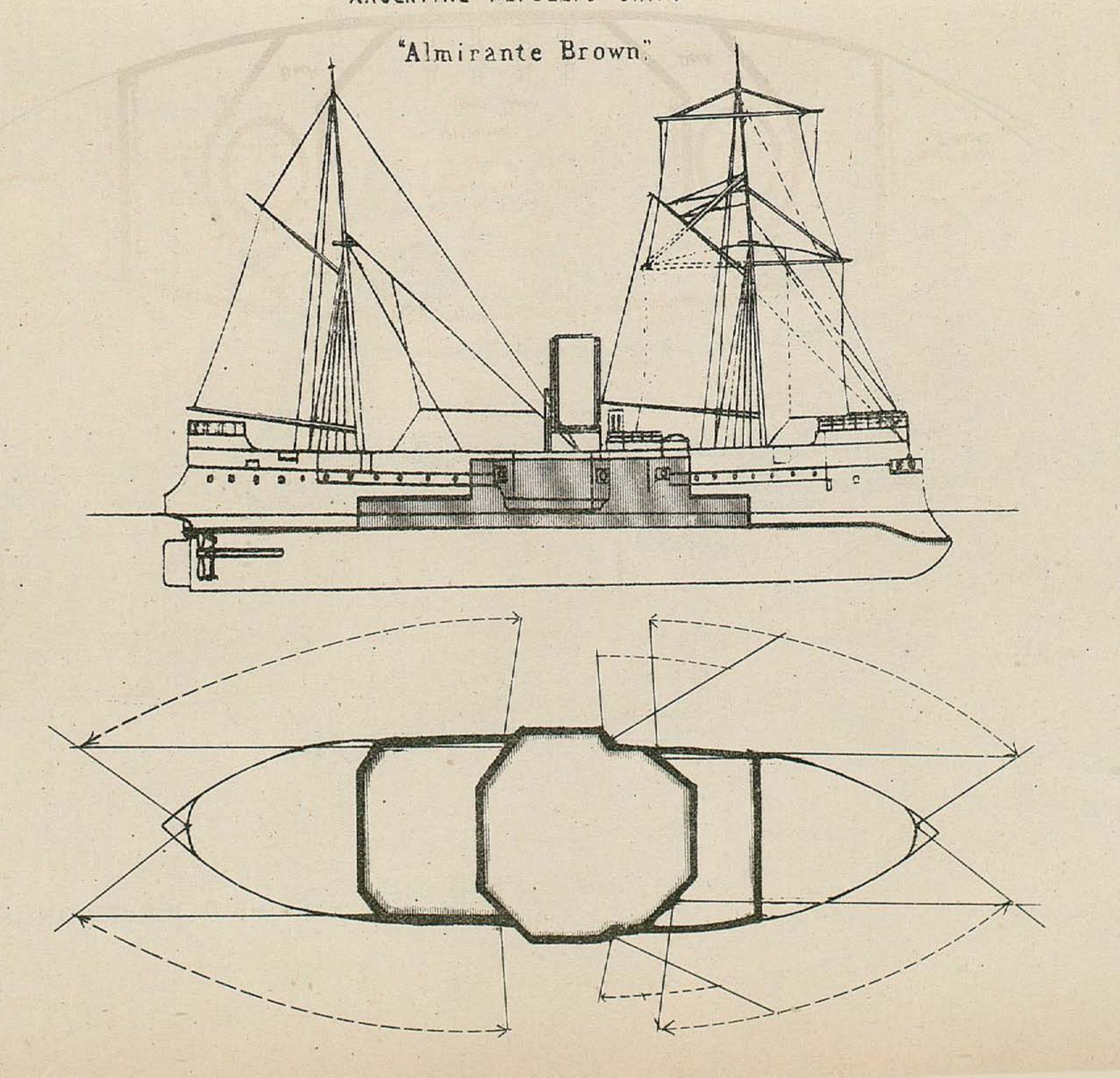
Section before Turret


"Trafalgar"
"Nile"
Armoured Belt on Water Line 20'
230' 0'
Cast Steel Ram filled in with teak.
A.B Lower Citidel.
C.D. Upper Citidel.
345 0'
193 0'
A
B
Armoured
Armoured Bulkhead
Armour 18'
G
Central Box Battery
110 0'
Armoured
Spar Deck
Deck
5' Armour
16' Armour
Steel Deck 3' thick
18'
16'

ARGENTINE REPUBLIC SHIPS

Pl. 21.

"Almirante Brown."



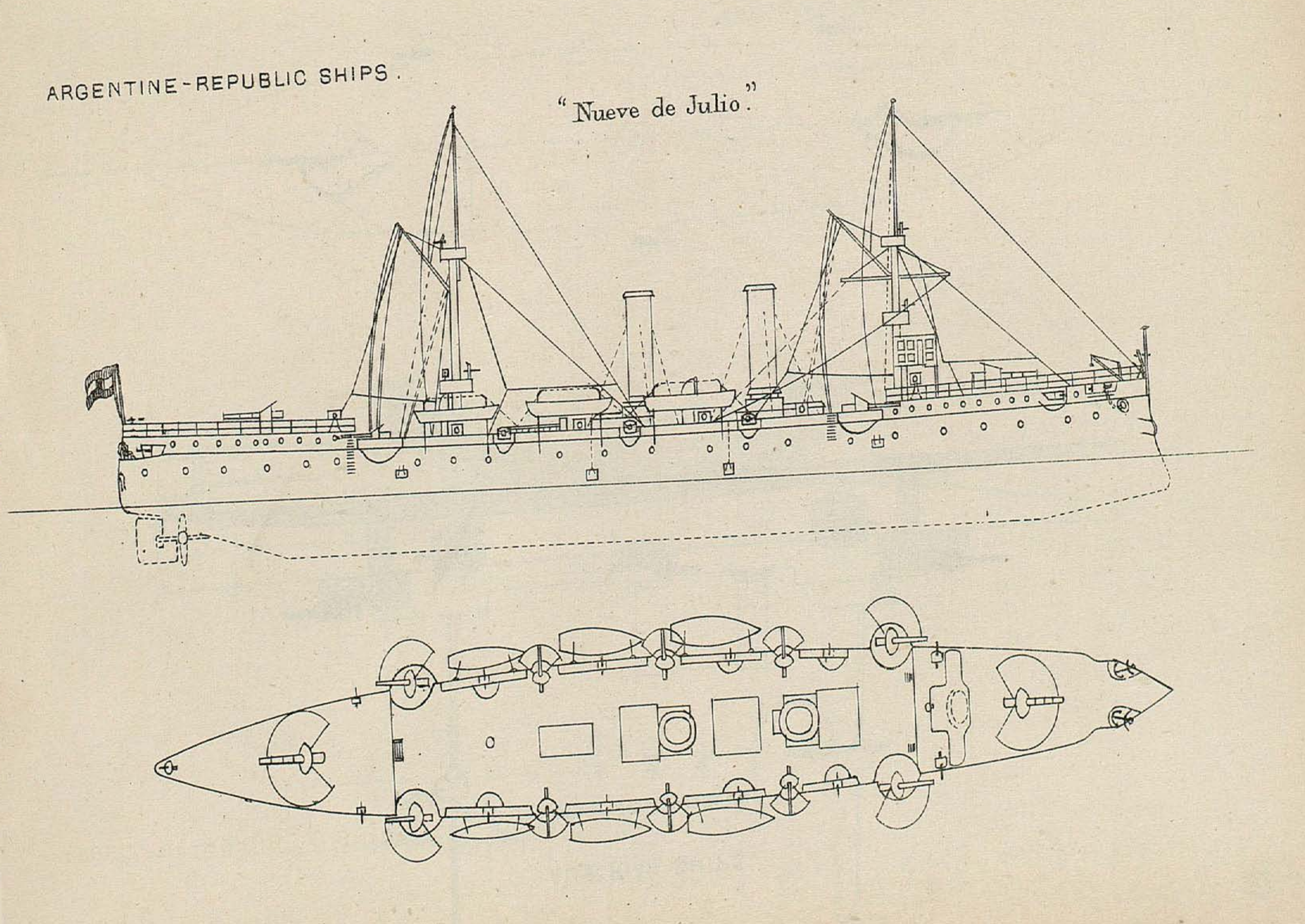


ARGENTINE-REPUBLIC SHIPS.

"Libertad & Independencia."

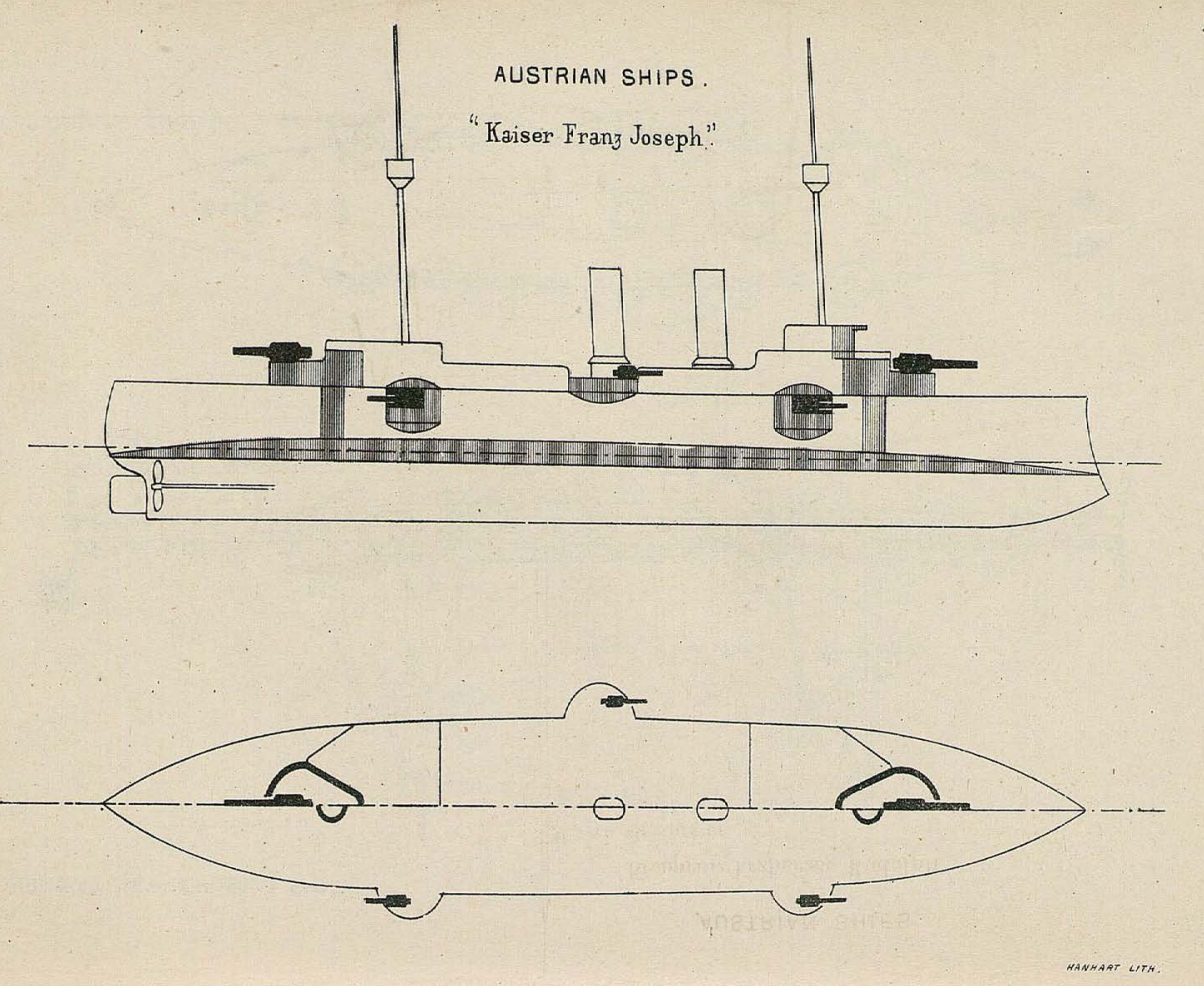
ARGENTINE-REPUBLIC SHIPS.

"Nueve de Julio."



AUSTRIAN SHIPS.

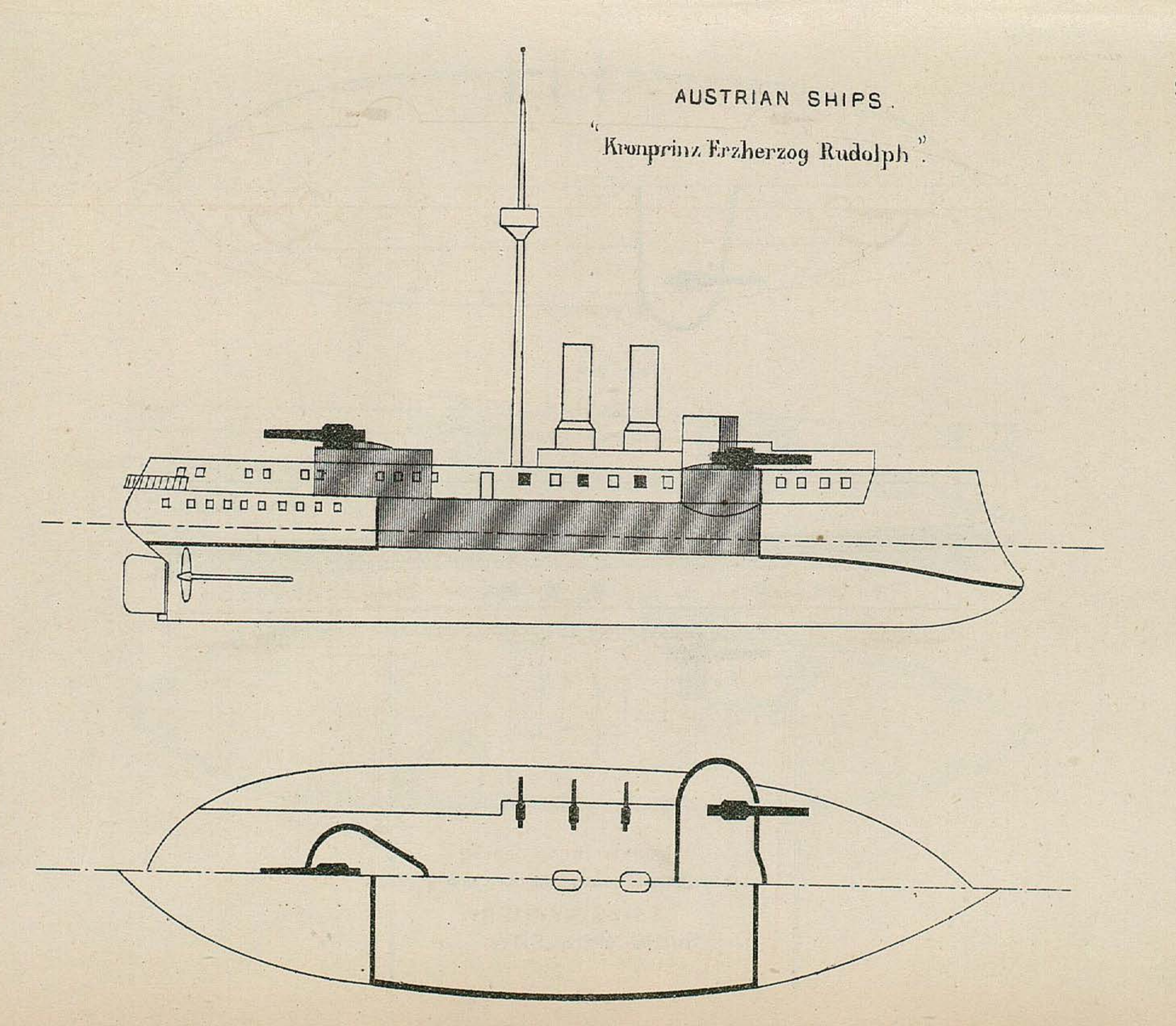
"Kaiser Franz Joseph."



HANHART LITH.

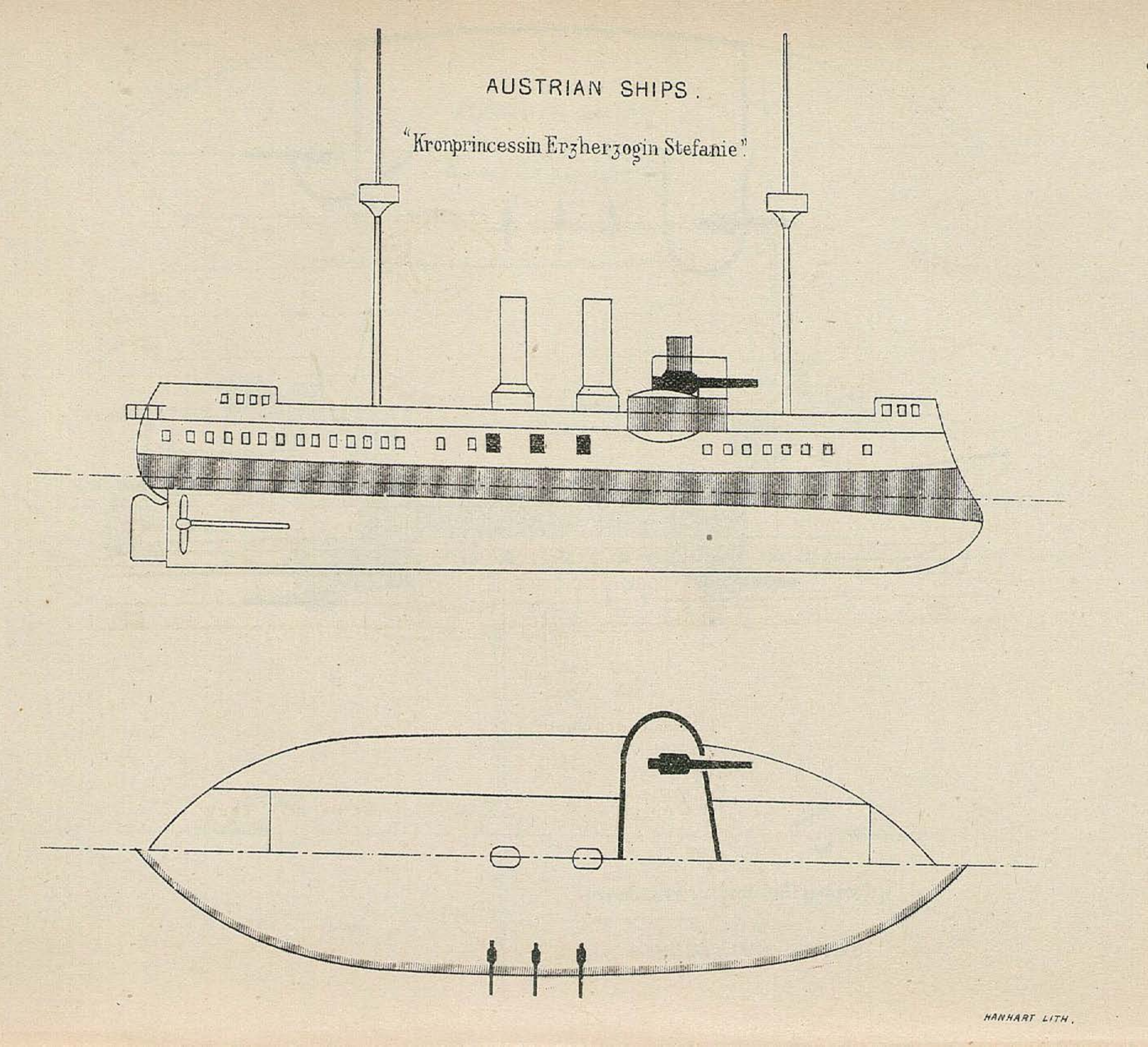
AUSTRIAN SHIPS.

"Kronprinz Erzherzog Rudolph".



AUSTRIAN SHIPS.

"Kronprincessin Erzherzogin Stefanie".

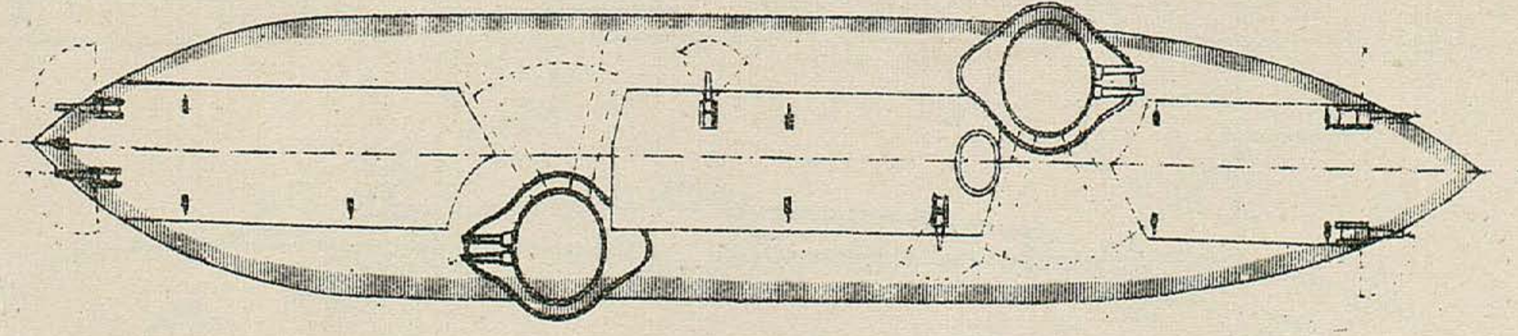


HANHART LITH.

BRAZILIAN SHIPS.

Pl. 27.

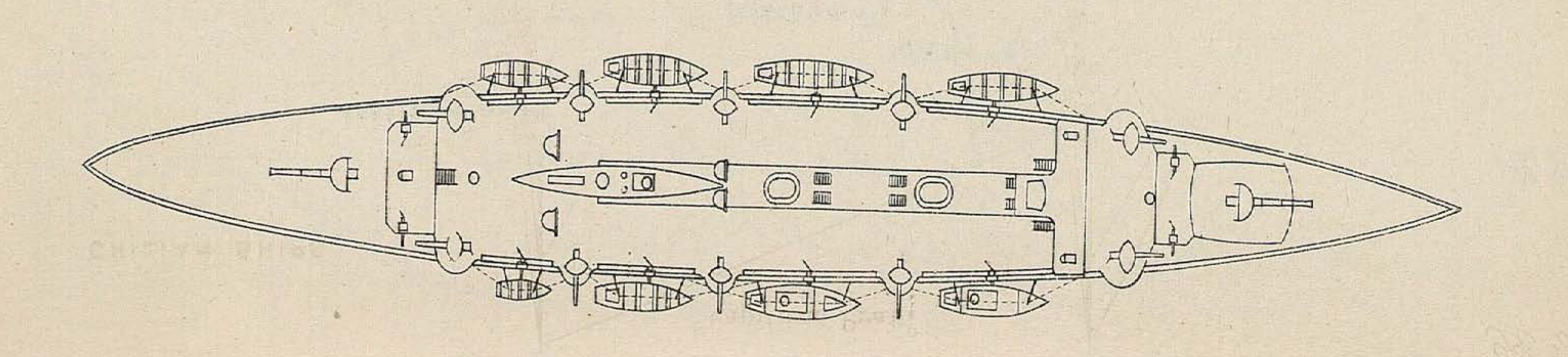
"Riachuelo."



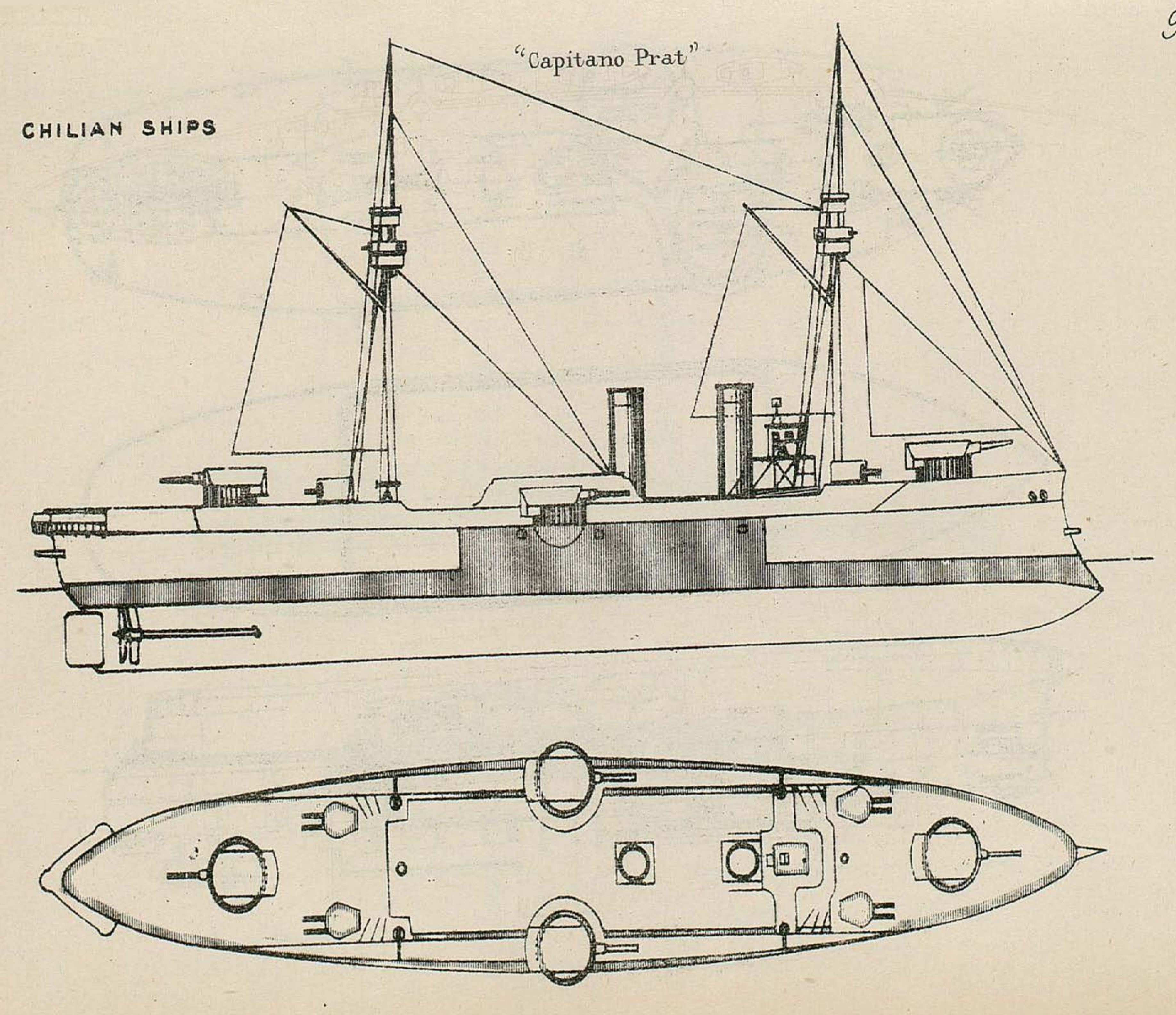
Plan of Upper Deck

CHILIAN SHIPS.

"Blanco Encalada".

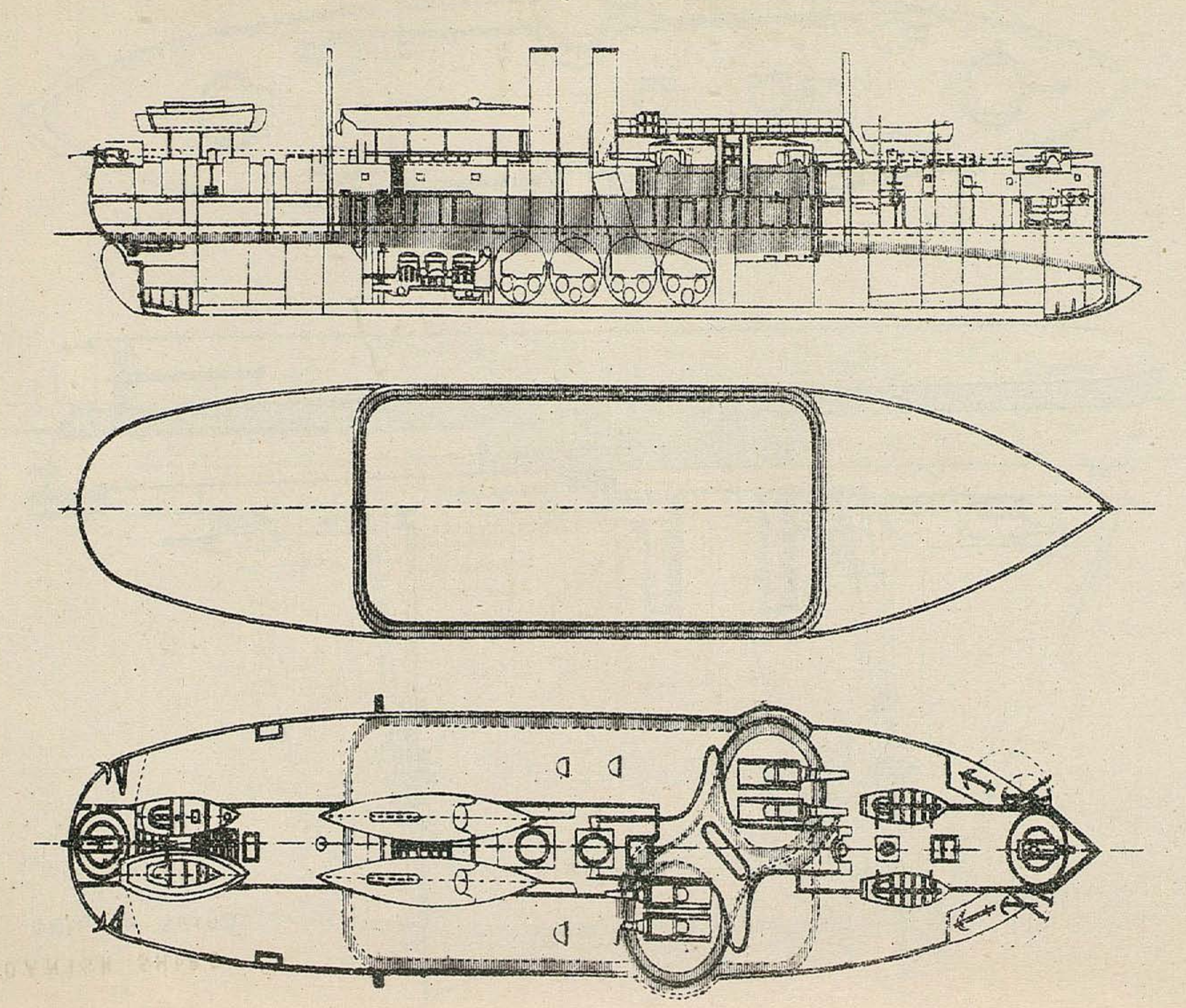


CHILIAN SHIPS

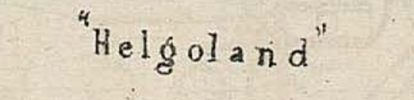


"Capitano Prat"

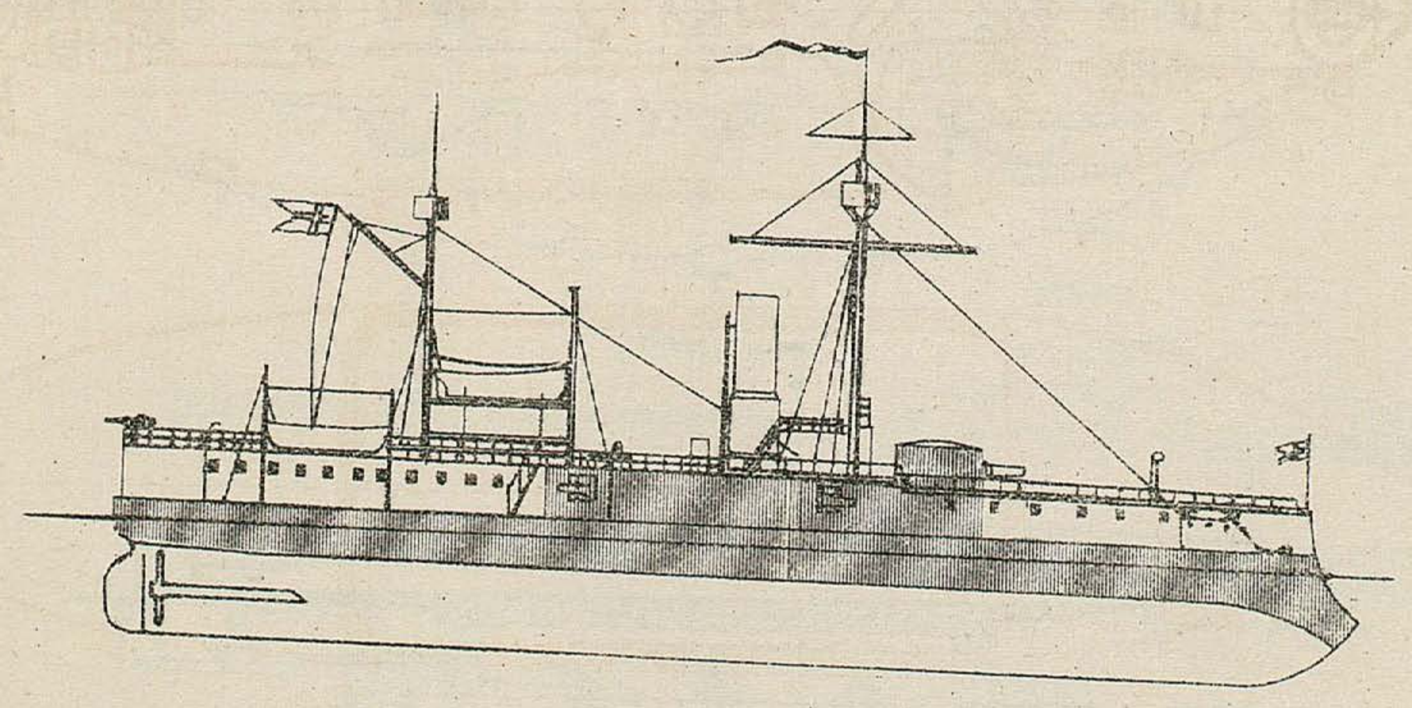
"Ting Yuen" & "Chen Yuen".

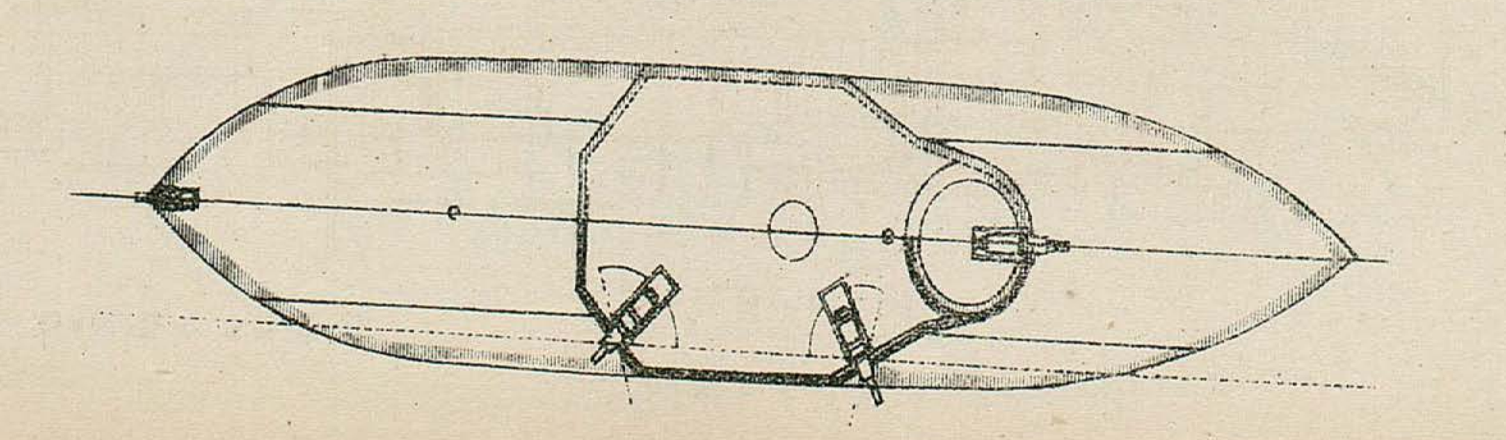


HANHART LITH



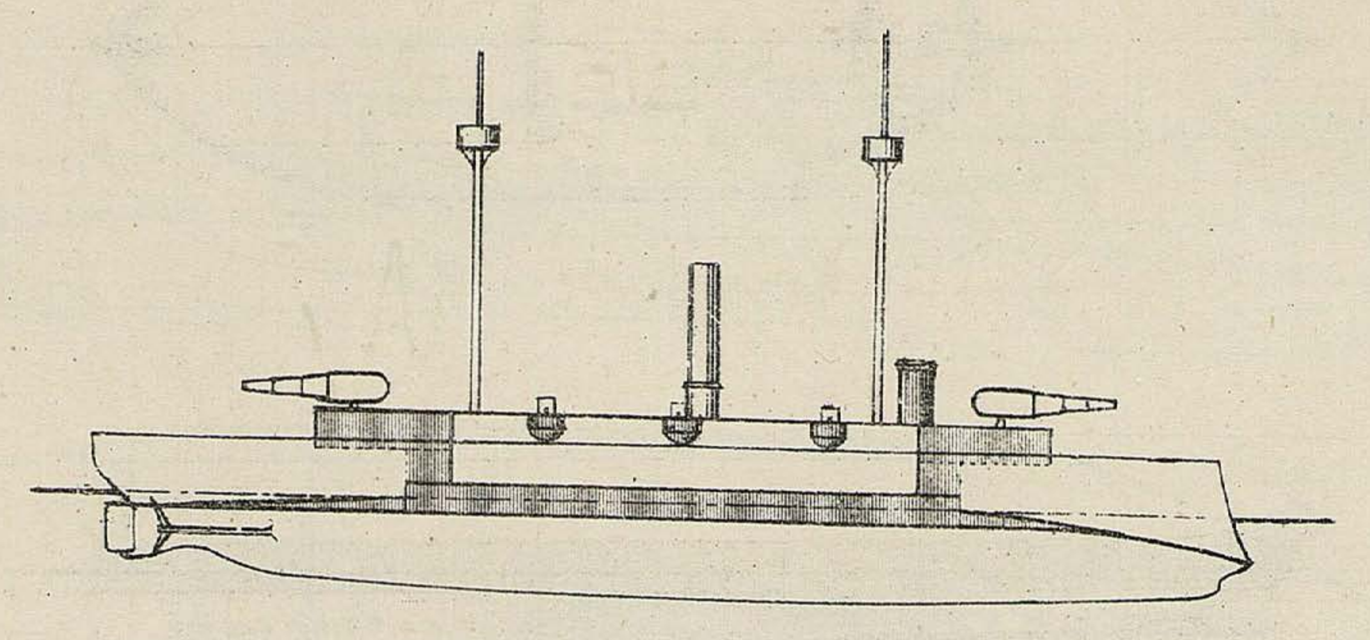
"Helgoland"



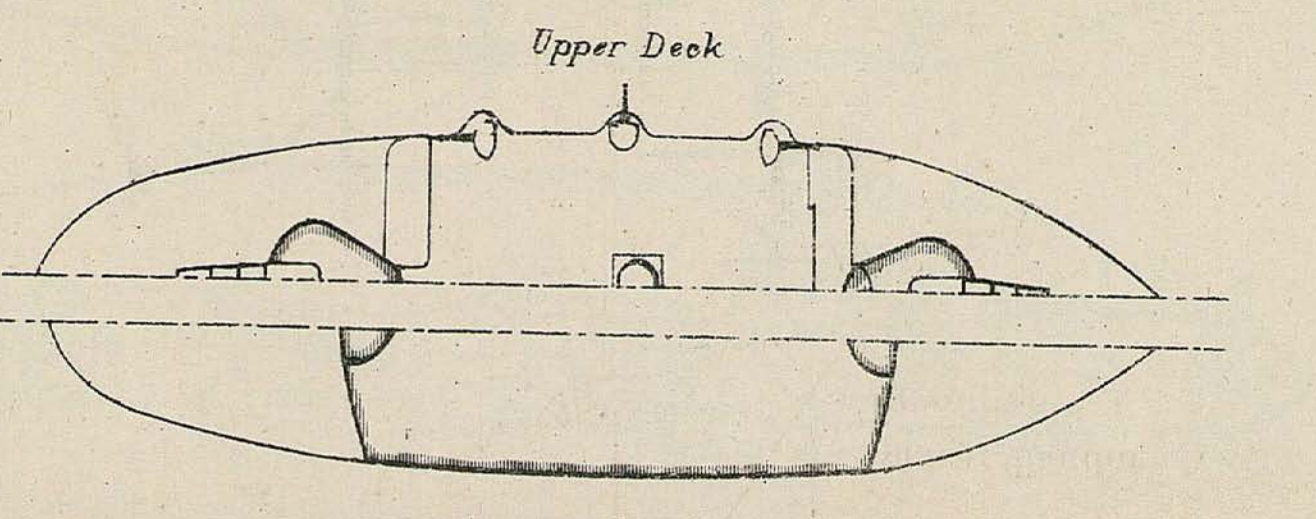


DANISH SHIPS.

"Iver Hvitfeld"



Upper Deck



Armoured Deck

BANKART LITH

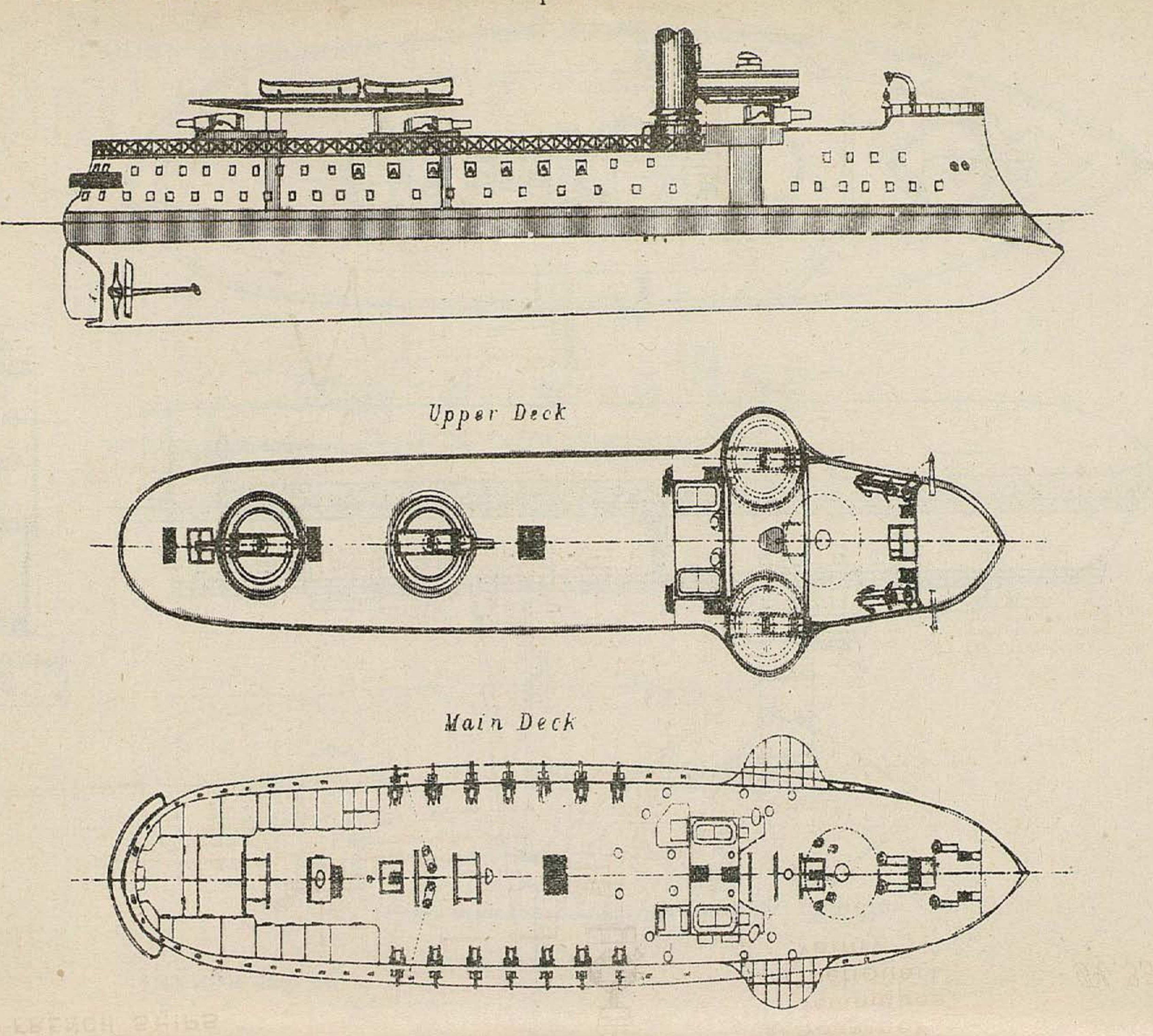
Pl. 33.

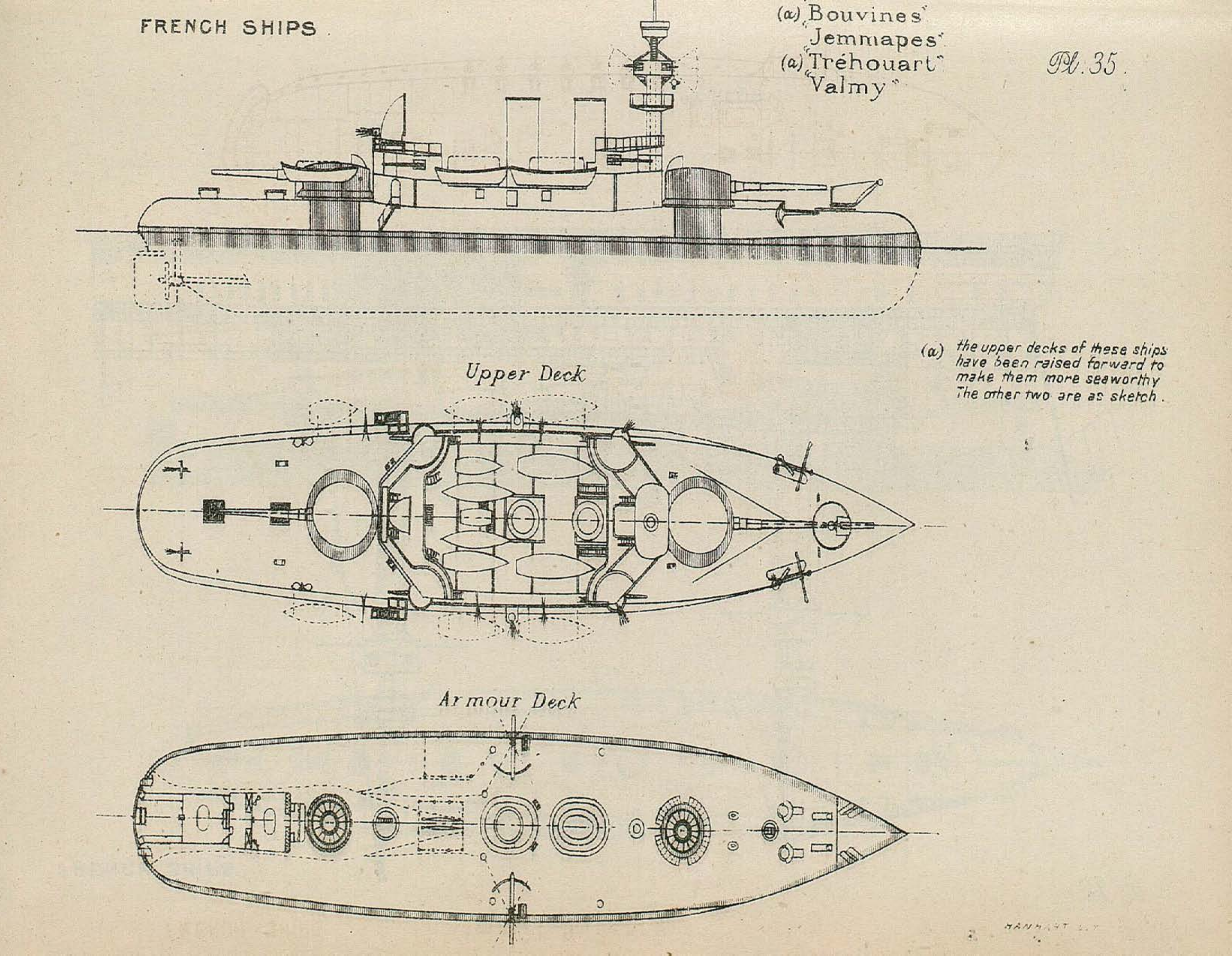
FRENCH SHIPS

"Amiral Baudin"
"Formidable"

HANHART LITH.

Amiral Duperré

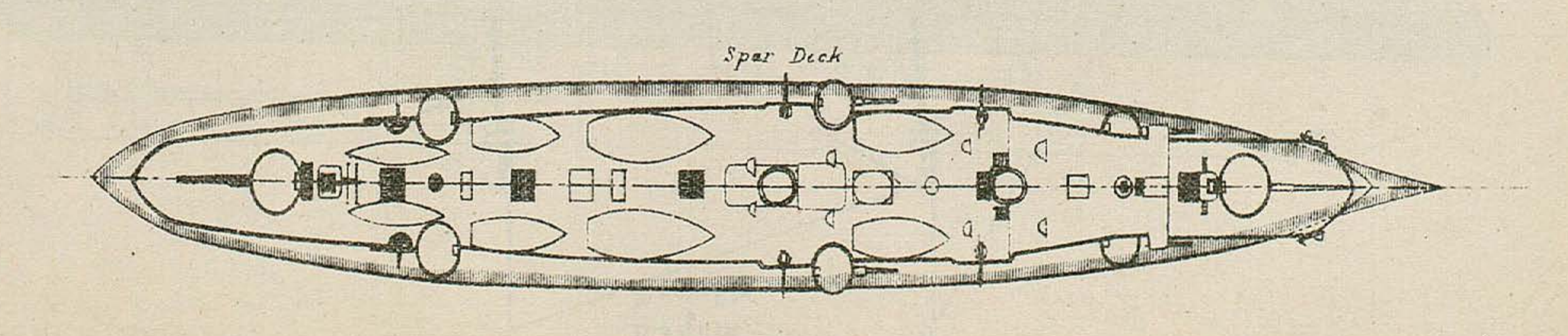



(a) "Bouvines"
"Jemmapes"
(a) "Tréhouart"
"Valmy"
Pl. 35.
Upper Deck
Armour Deck
(a) the upper decks of these ships have been raised forward to make them more seaworthy
The other two are as sketch.

"Brennus".

FRENCH SHIPS.

"Bruix" Class { "Bruix". "Chanzy". "Charner". "Latonche-Tréville".



FRENCH SHIPS

"Caiman"
"Indomptable"
"Requin"
"Terrible"

Pl. 38

45

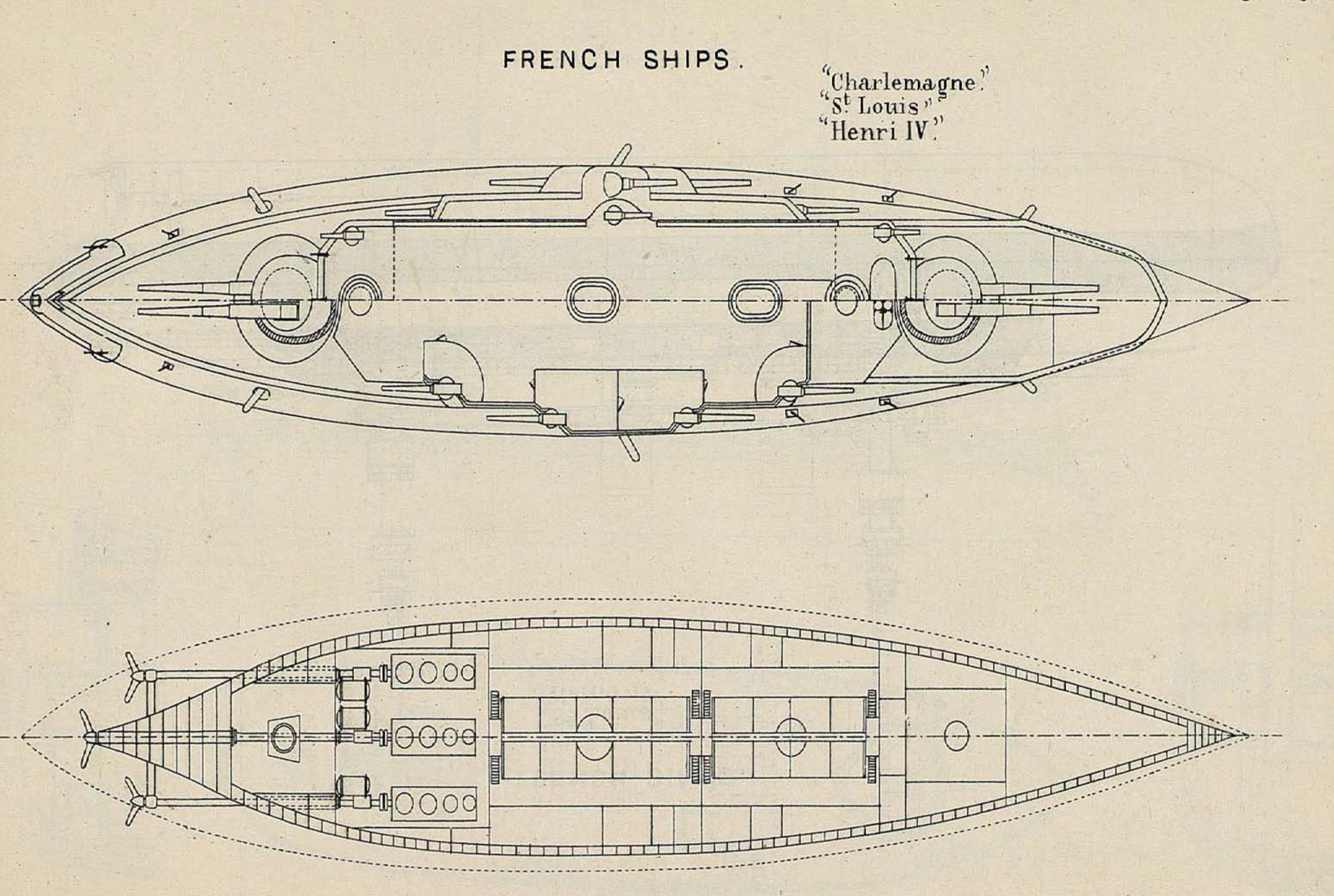
HANHART LITH

FRENCH SHIPS.

"Charlemagne"
"St Louis"
"Henri IV"

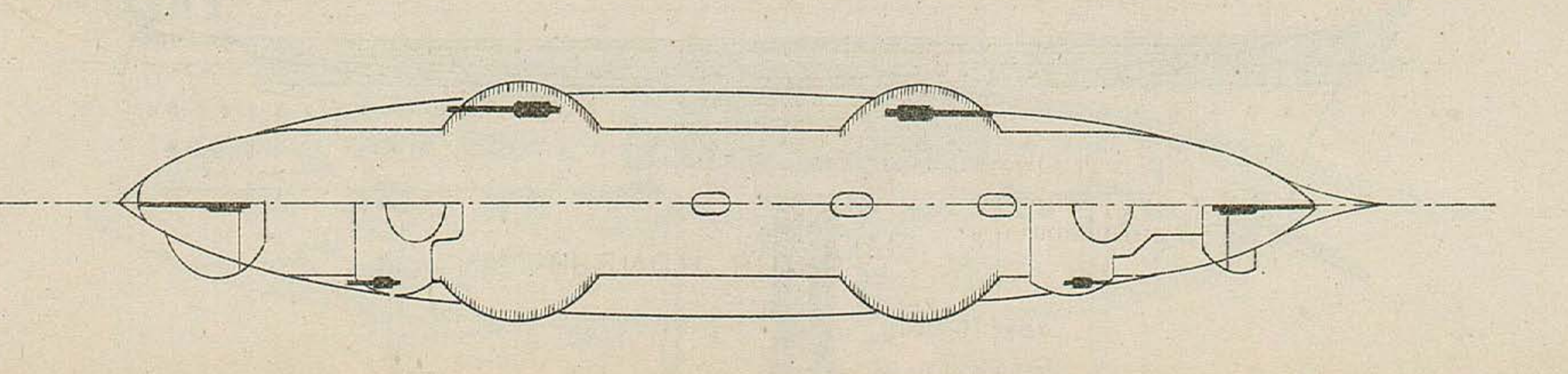
FRENCH SHIPS.

"Charlemagne."
"St Louis"
"Henri IV."

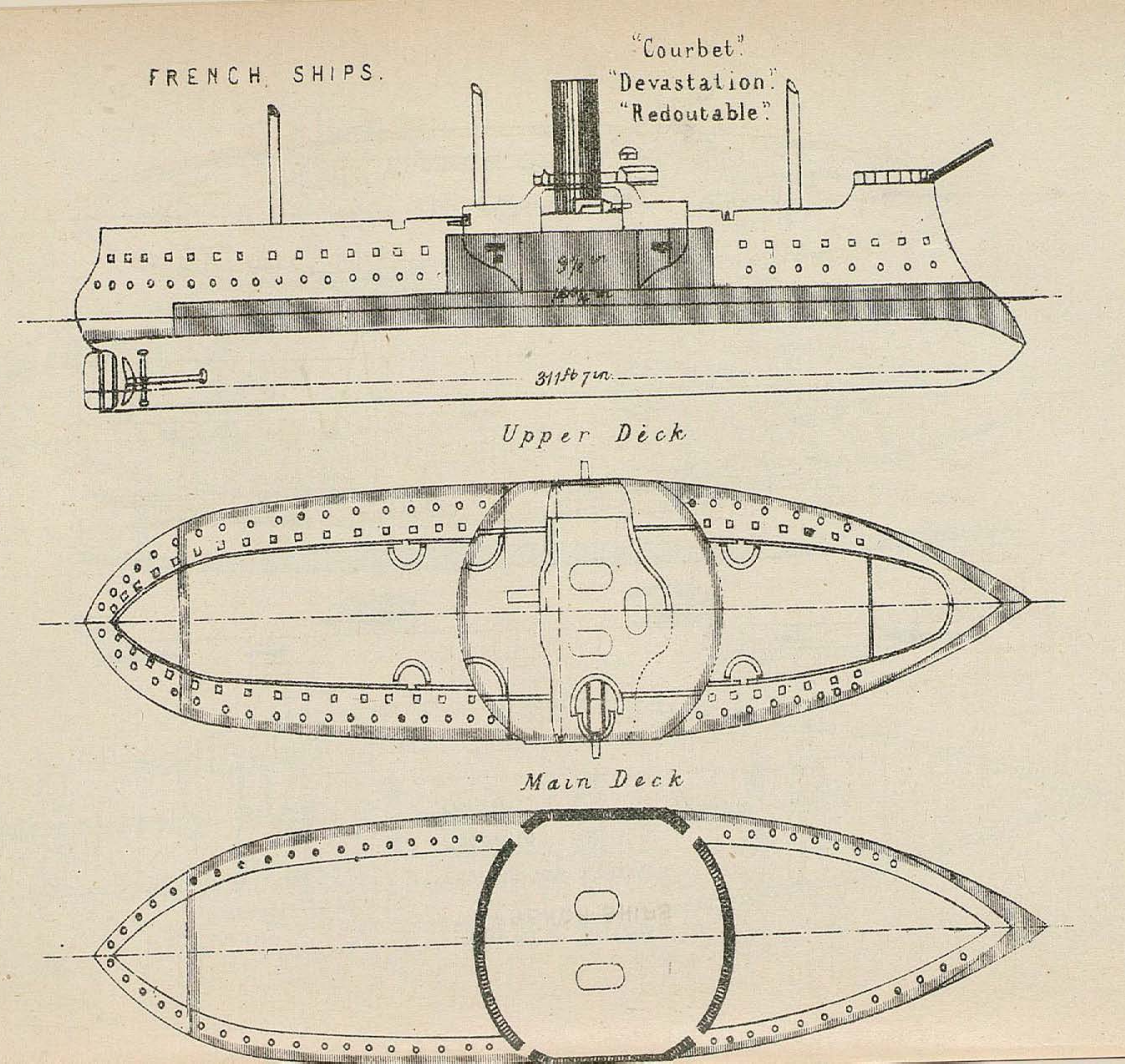


FRENCH SHIPS.

"Chasseloup Laubat."
"Bugeaud."
"Friant."



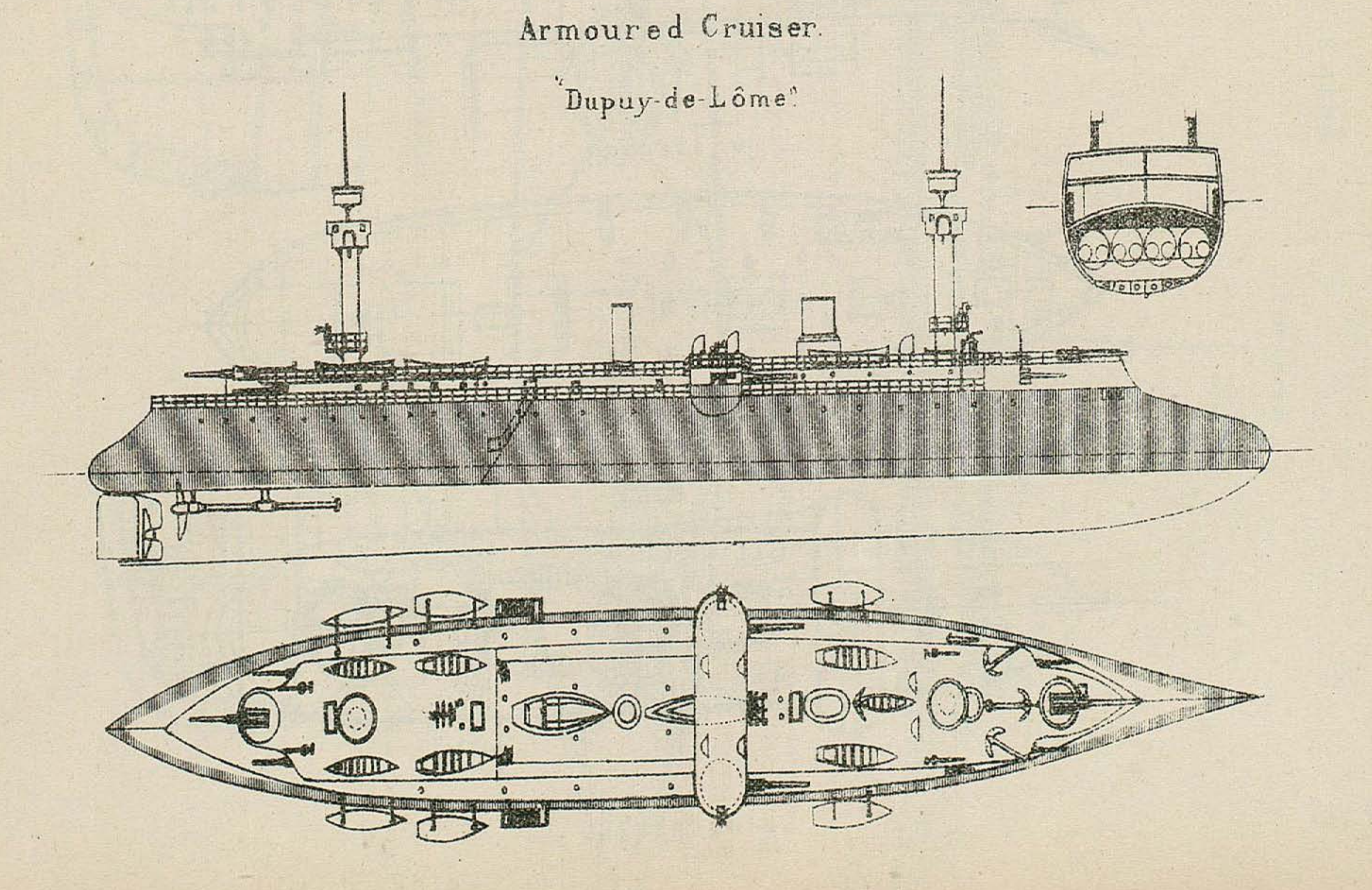
HANHART LITH.


Pl. 40.
FRENCH SHIPS.
"Courbet."
"Devastation."
"Redoutable."
9½ in.
311 ft 7 in.
Upper Deck
Main Deck

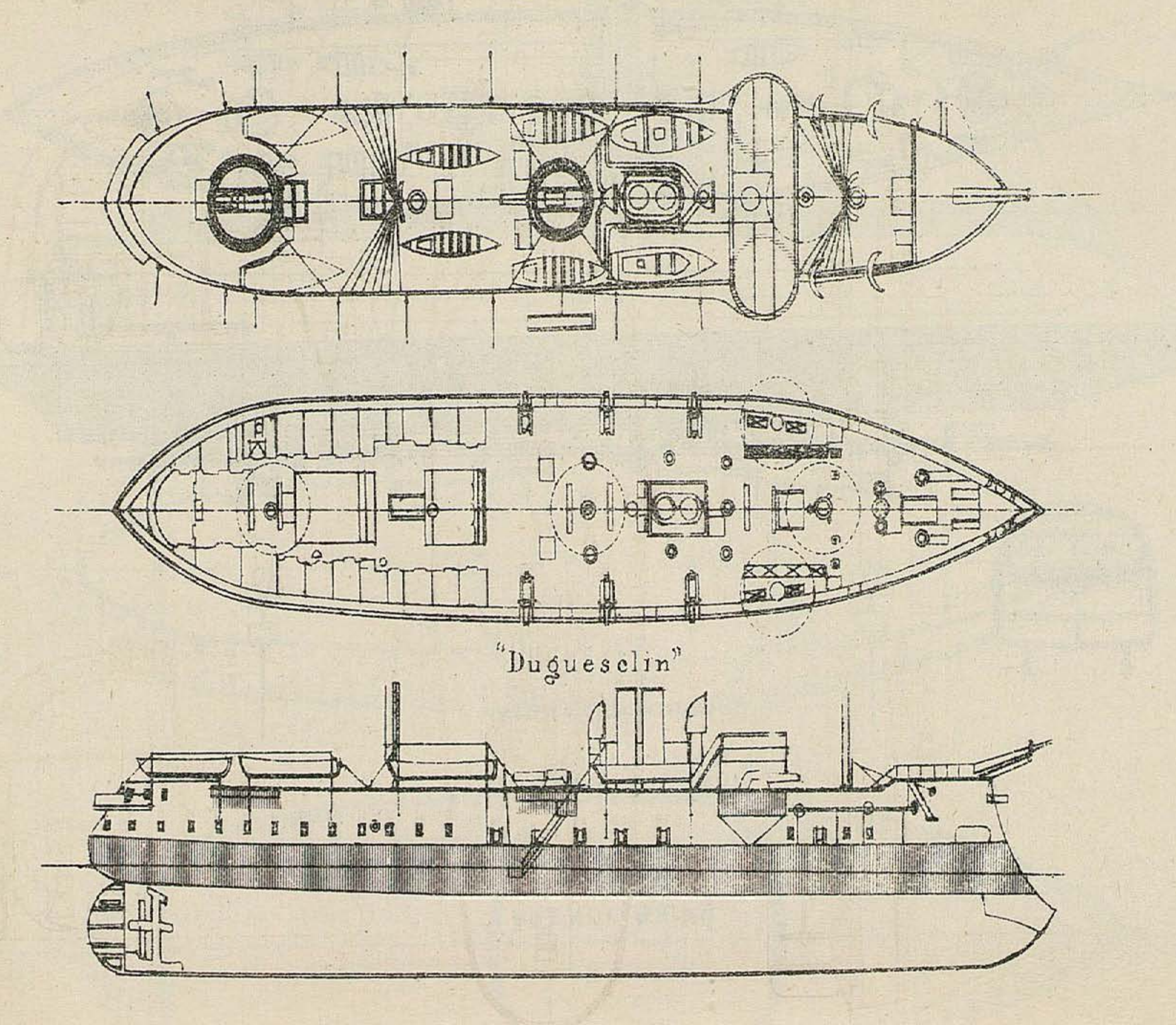
FRENCH SHIPS.

Armoured Cruiser.

"Dupuy-de-Lôme".

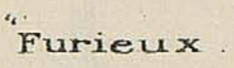


FRENCH SHIPS



"Duguesclin"

FRENCH SHIPS



Section at funnel

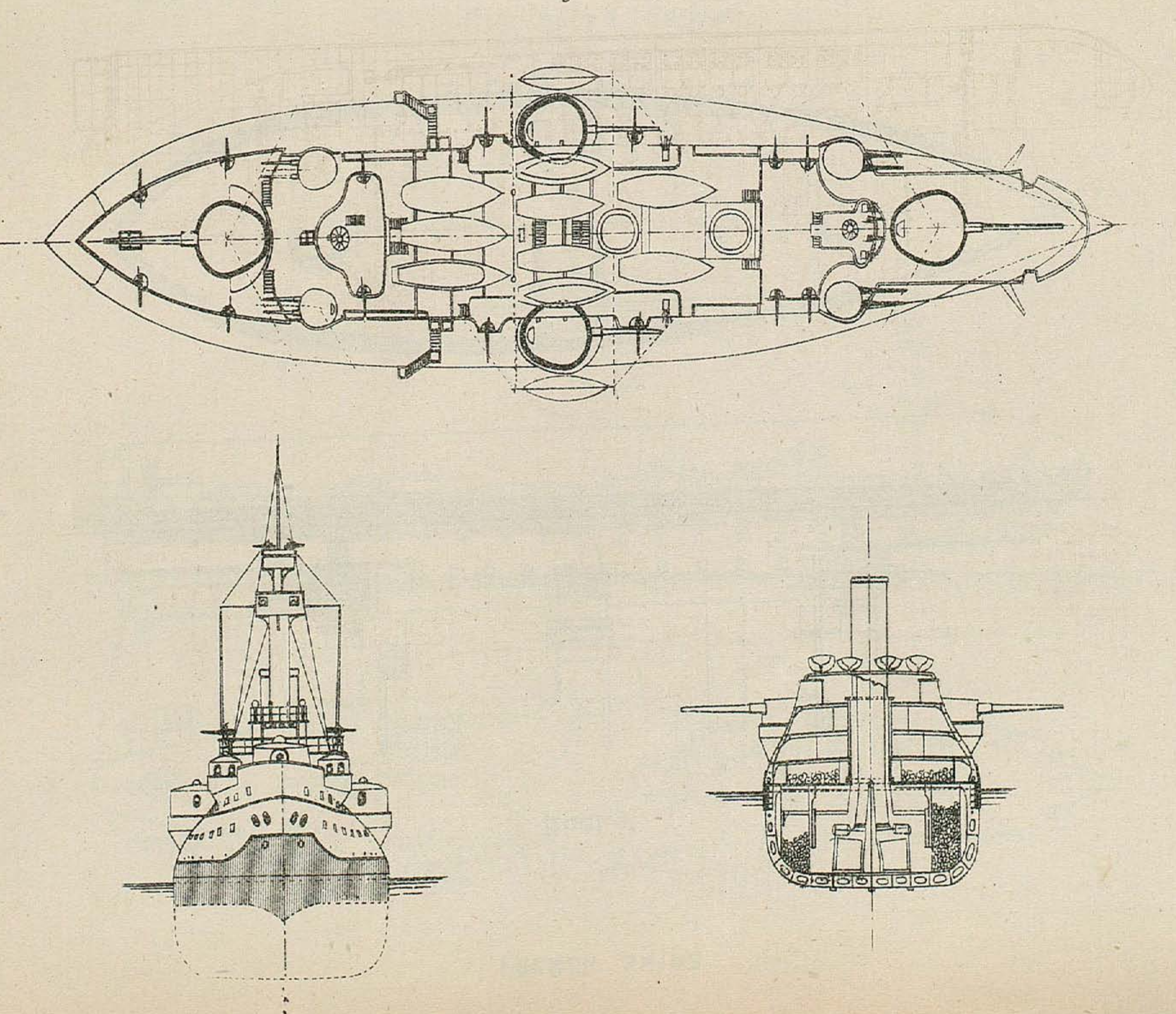
Section at foremast

FRENCH SHIPS.

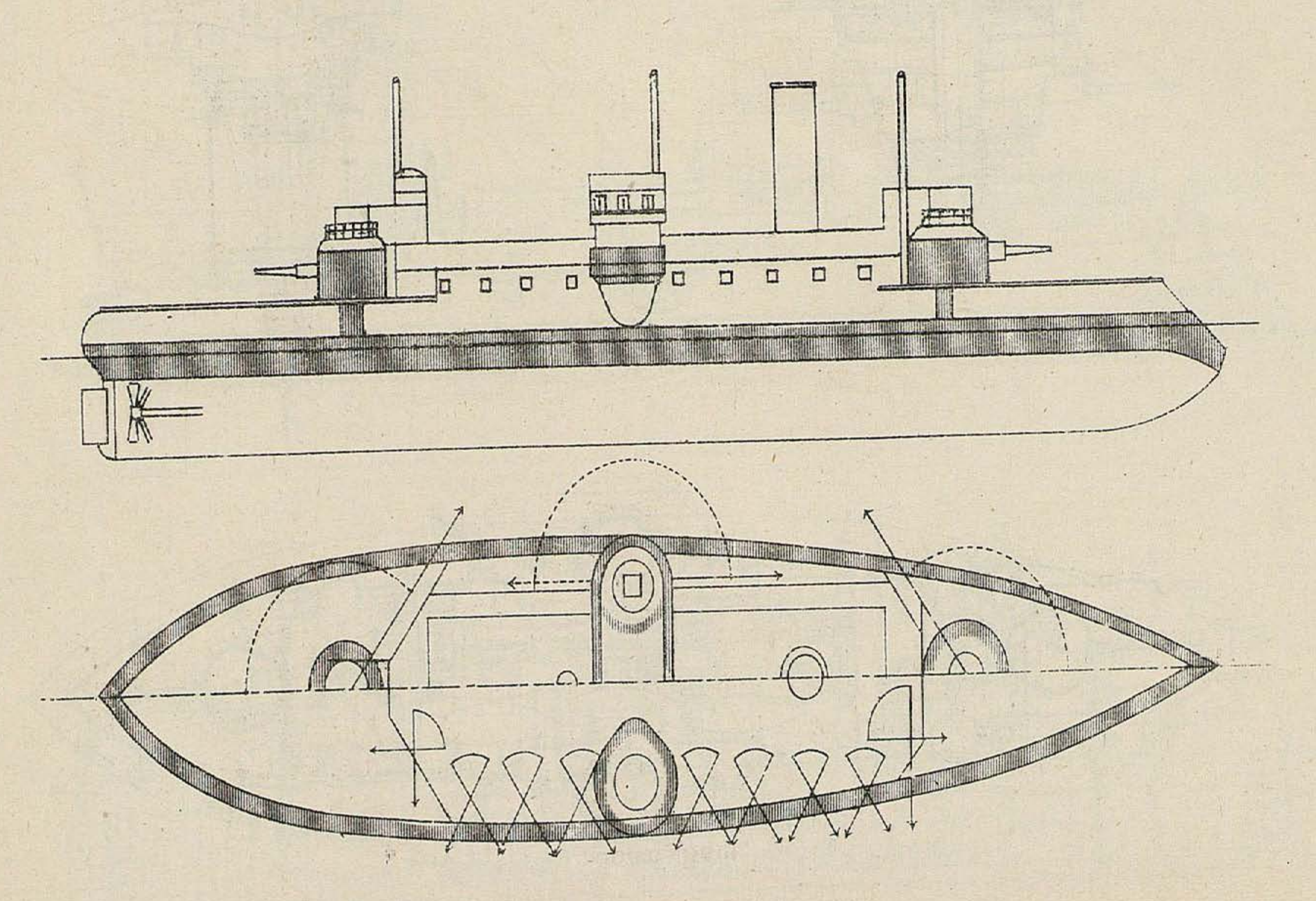
"Jauréguiberry".

HANHART LITH.

"Jauréguiberry."

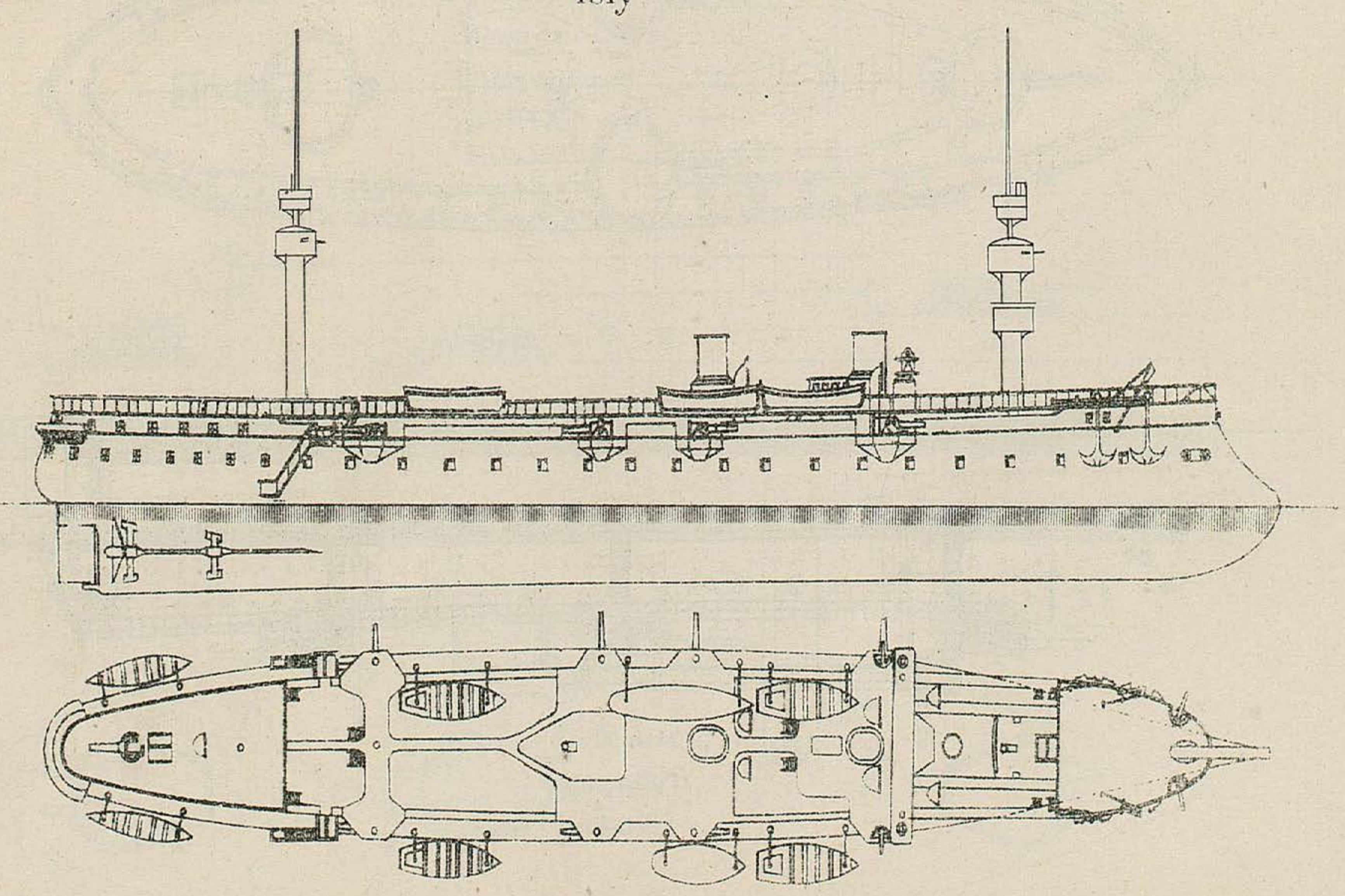


"Hoche".



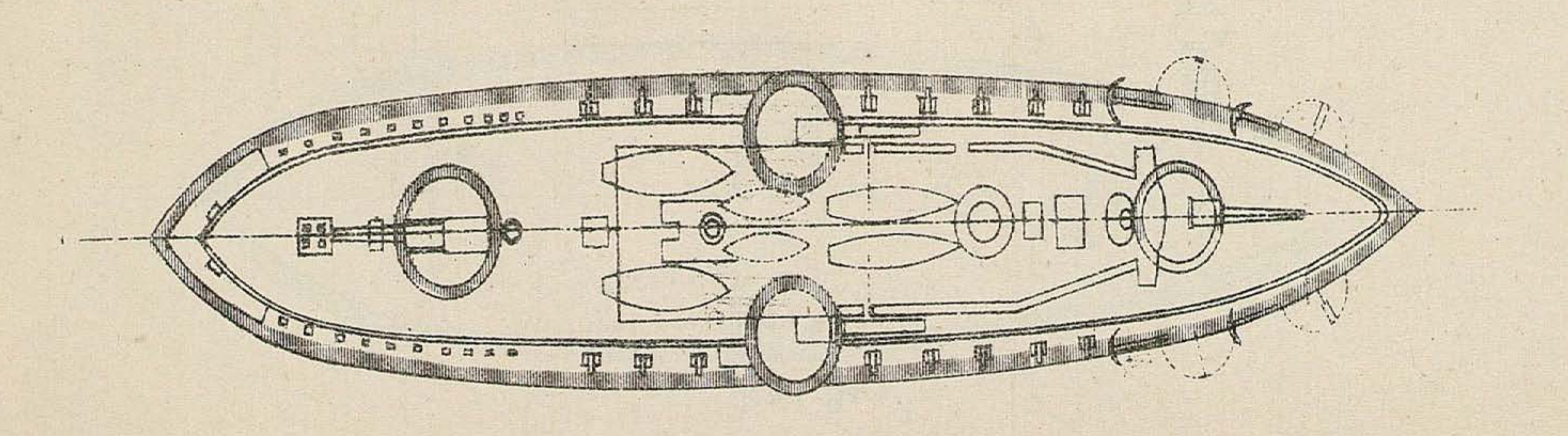
Protected Cruiser.

"Jean-Bart"
"Alger"
"Isly"



FRENCH SHIPS

"Magenta."
"Marceau."
"Neptune."

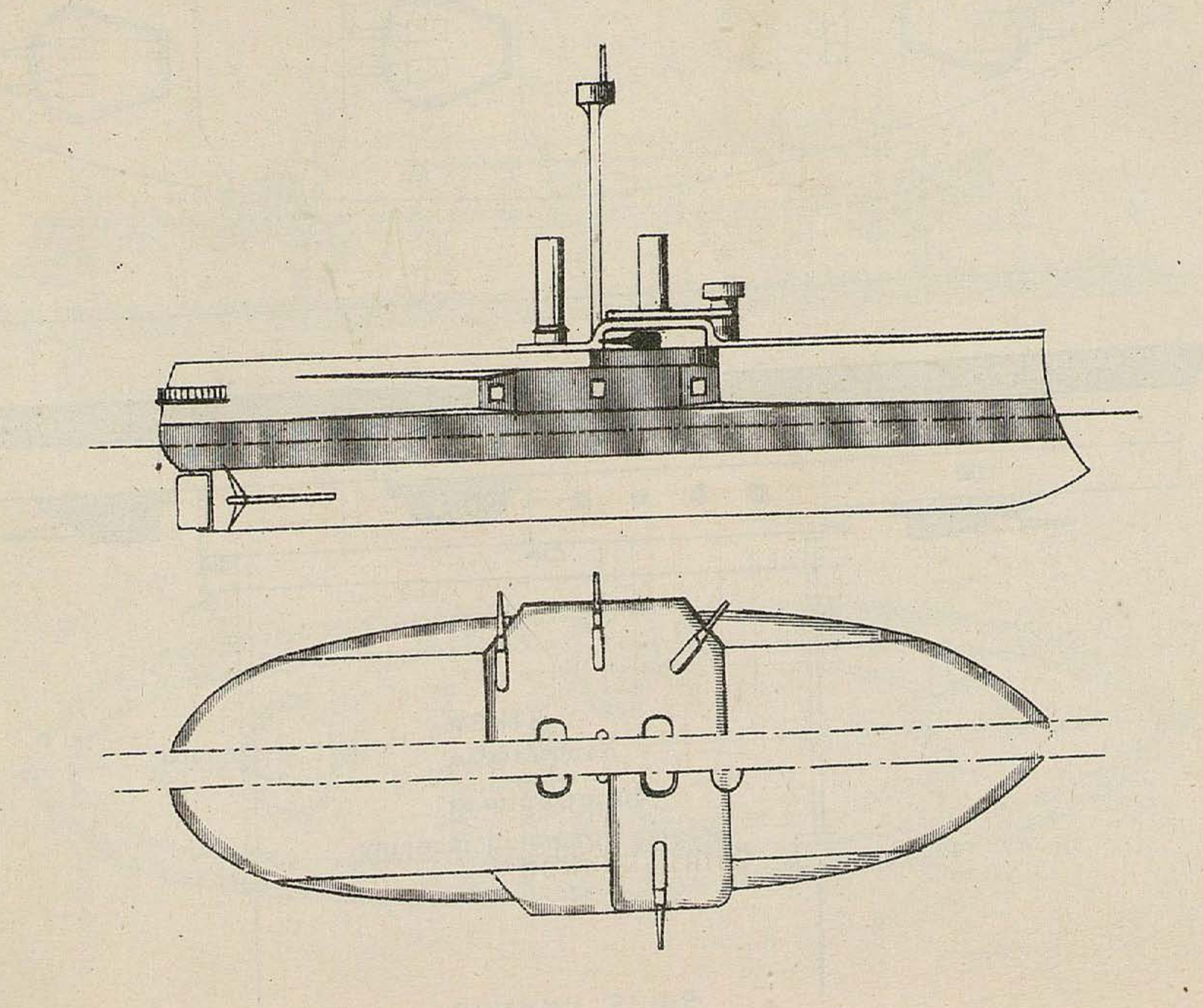


GERMAN SHIPS

"Kurfürst Friedrich Wilhelm".
"Brandenburg".
Weissenburg"
"Wöerth".

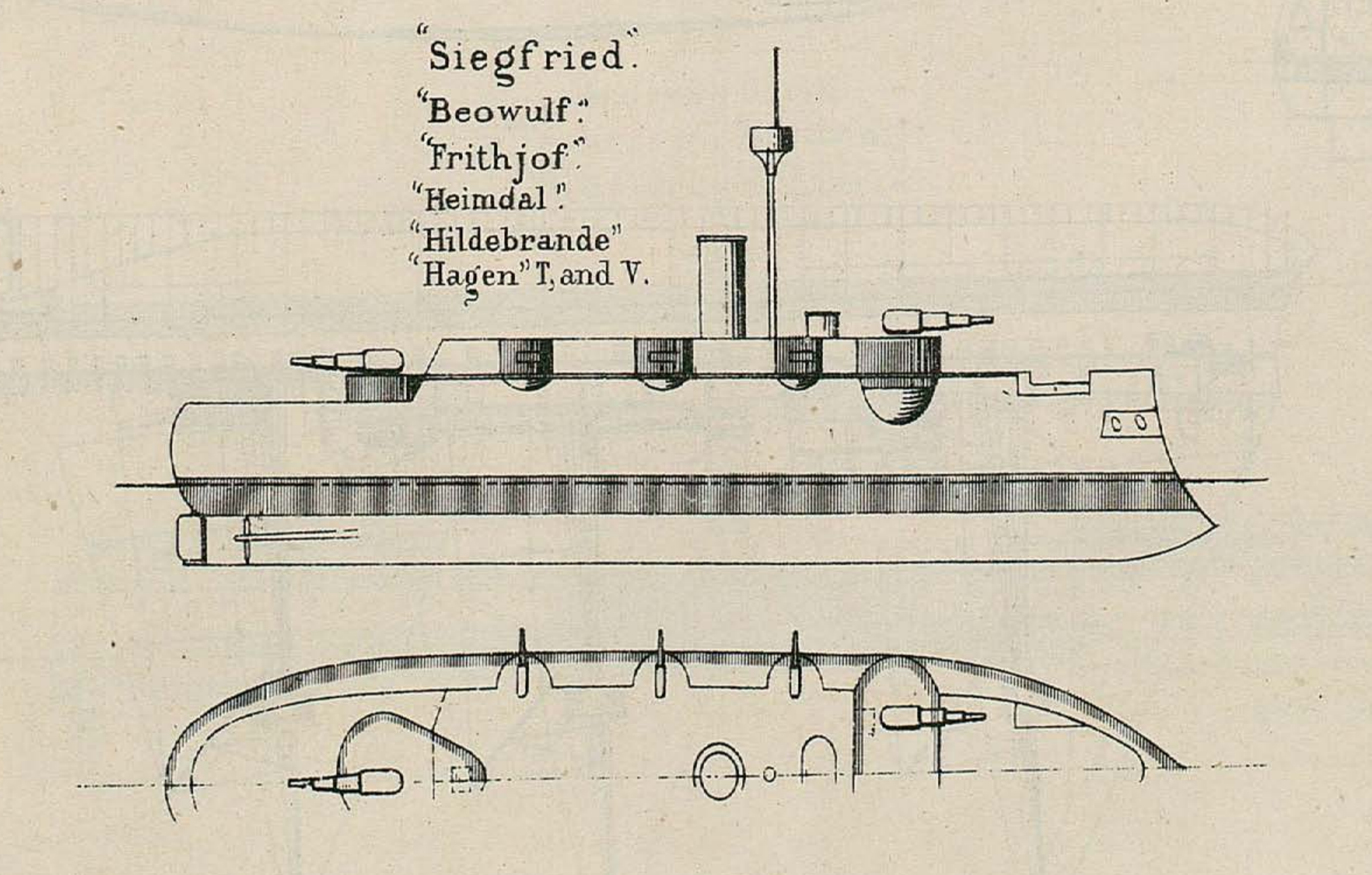
GERMAN SHIPS

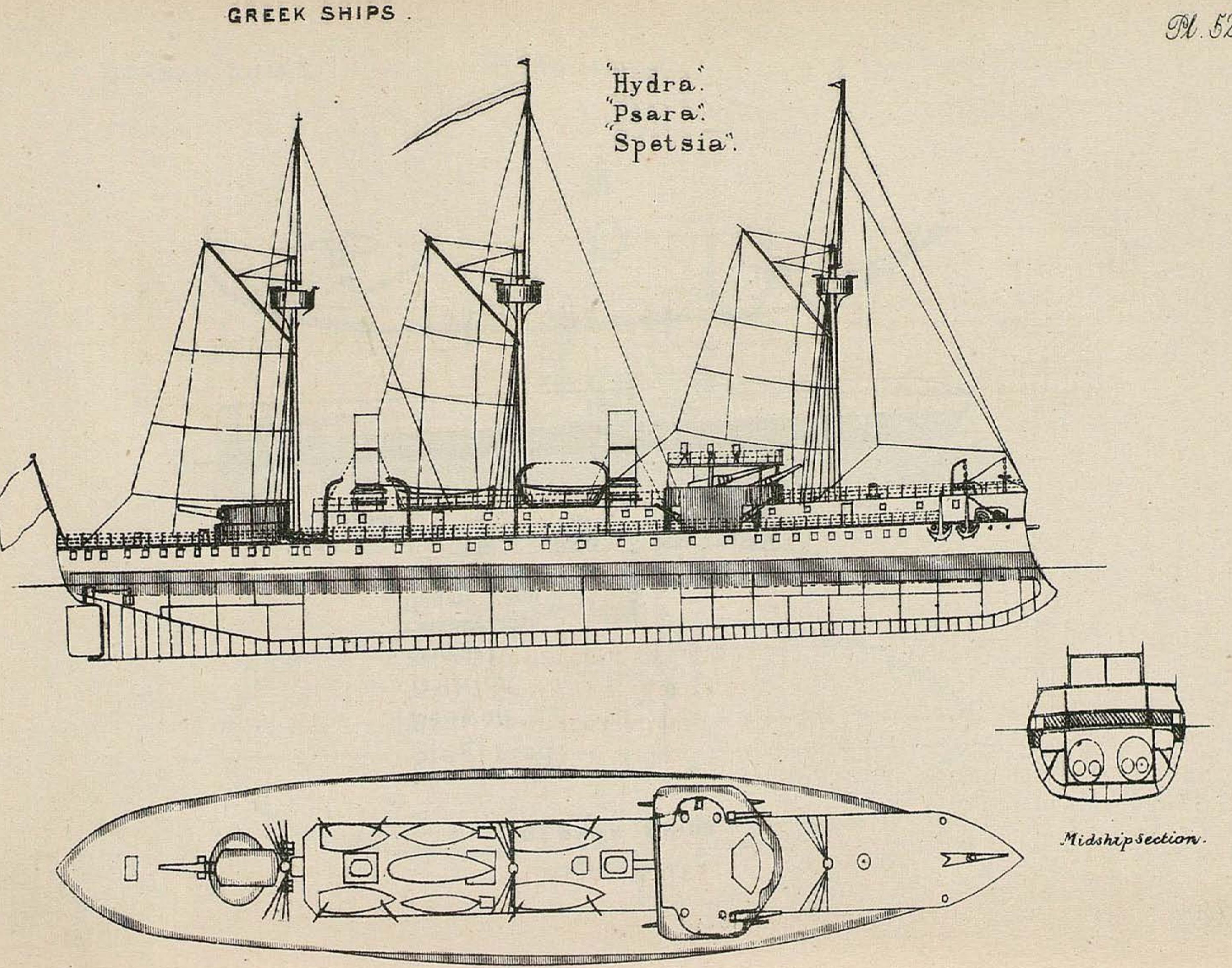
"Oldenburg"



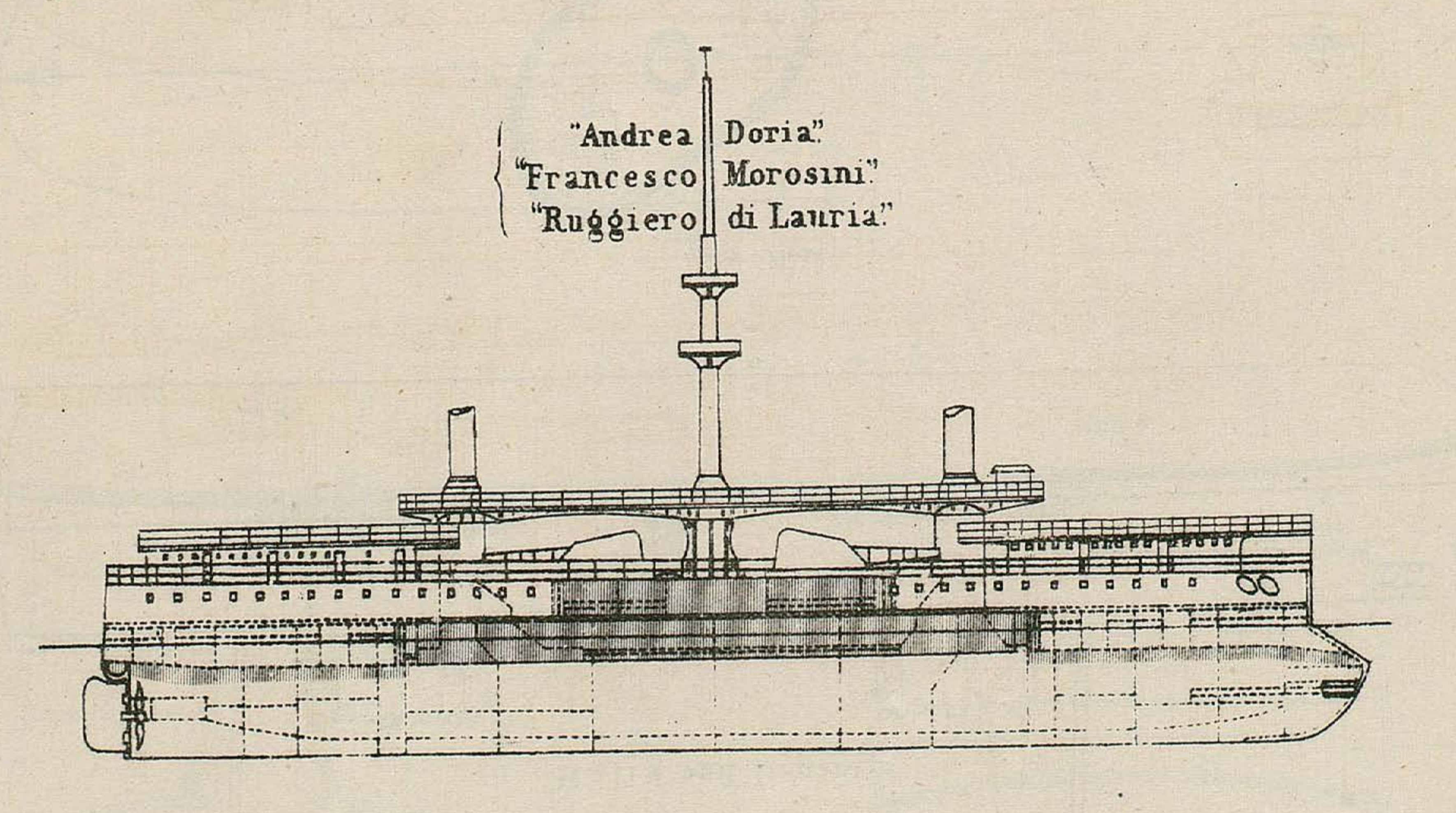
GERMAN SHIPS.

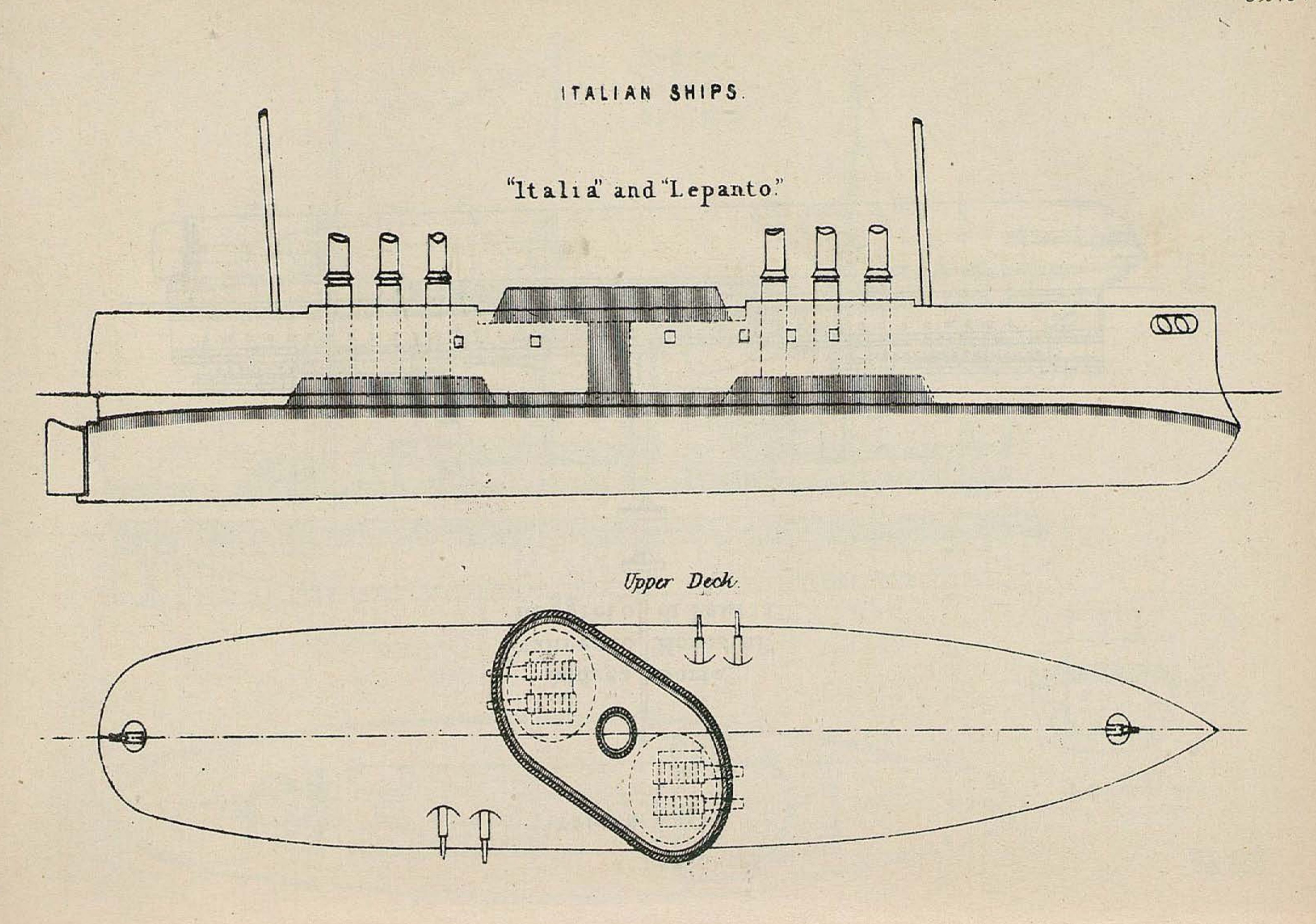
"Siegfried."
"Beowulf."
"Frithjof."
"Heimdal."
"Hildebrande"
"Hagen" T, and V.




"Hydra."
"Psara."
"Spetsia."
Midship Section.
Upper Deck.

ITALIAN SHIPS.




ITALIAN SHIPS.
"Italia" and "Lepanto."
Upper Deck.

ITALIAN SHIPS.

"Italia" and "Lepanto".

Main Deck

"Sardegna".

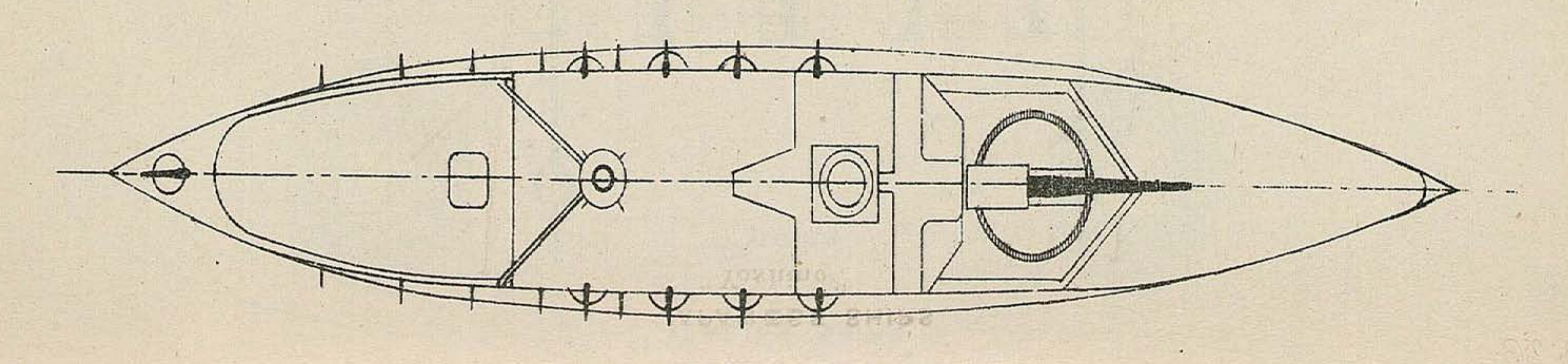
ITALIAN SHIPS.

Pl. 57.

"Sicilia".

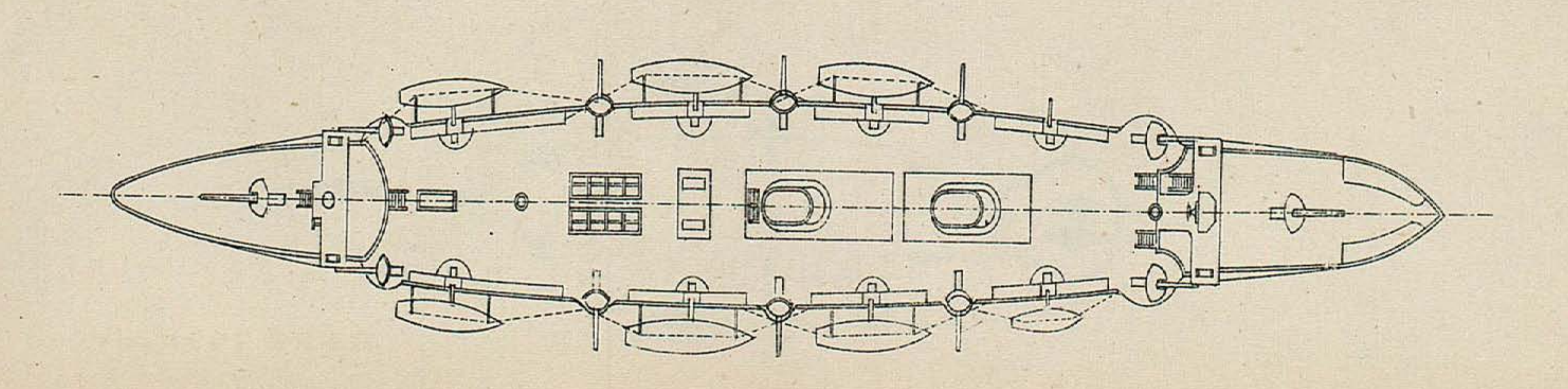
HANHART LITH

"Itsukusima"



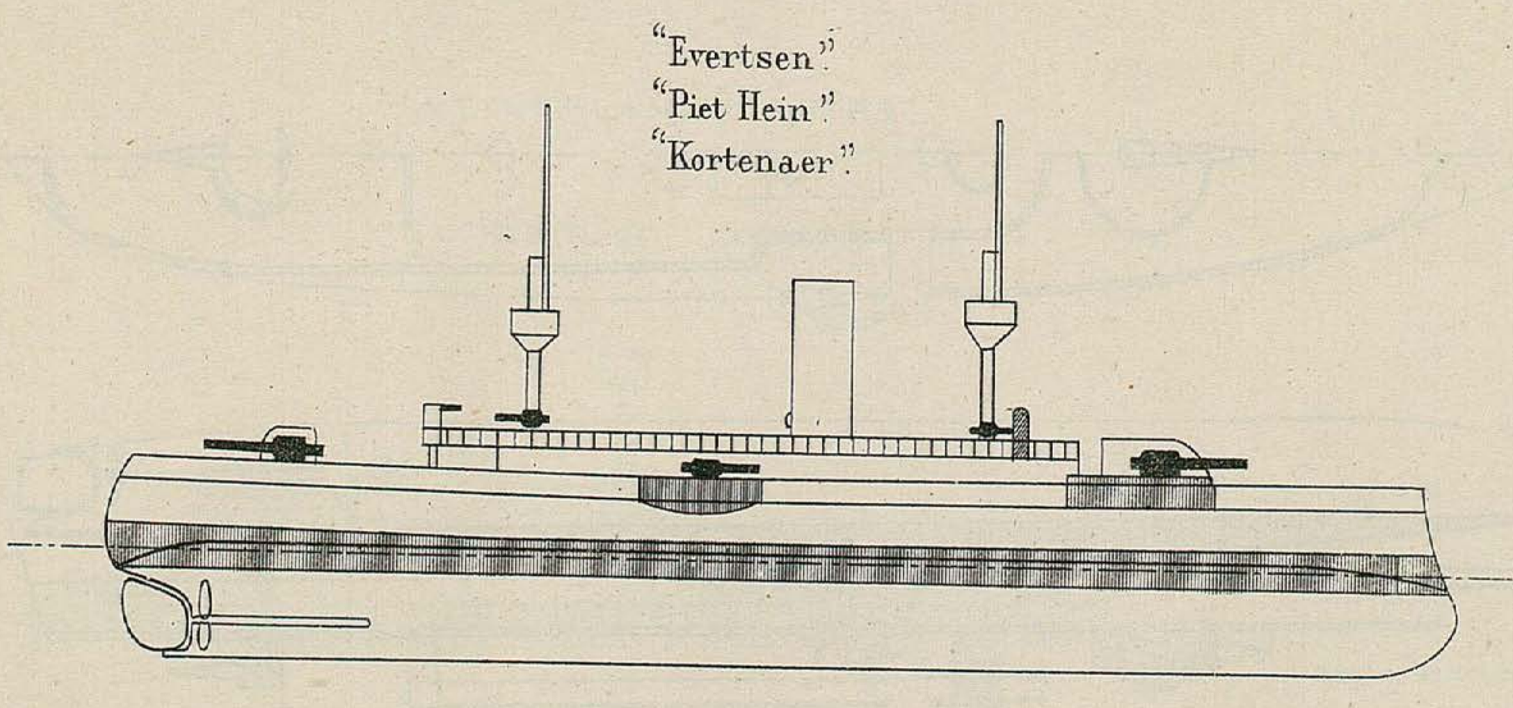
JAPANESE SHIPS.

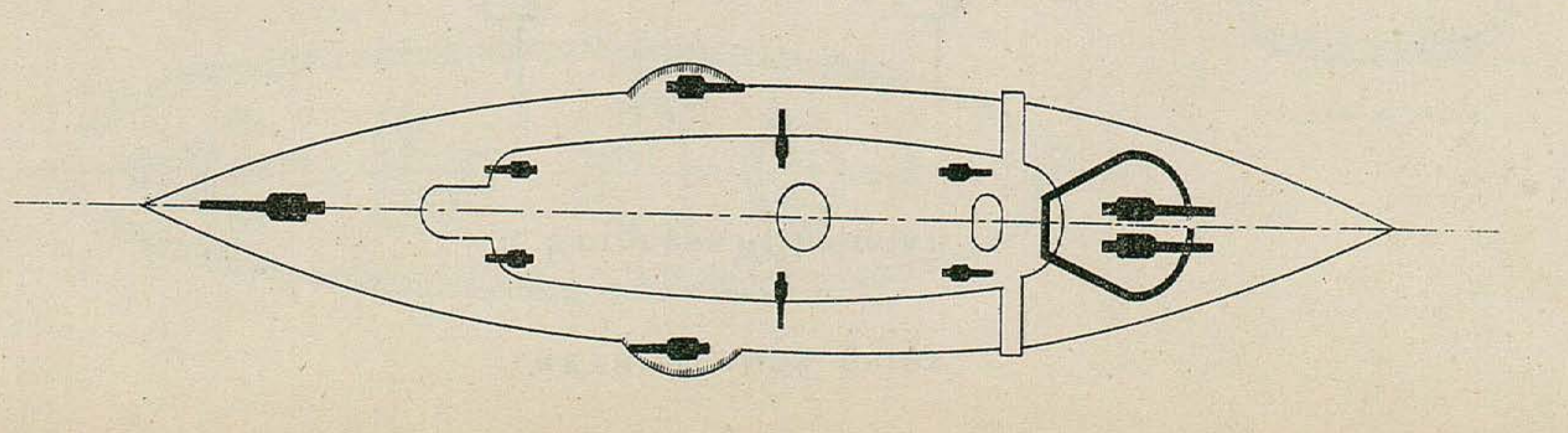
"Yoshino".



NETHERLANDS SHIPS.

"Evertsen."
"Piet Hein."
"Kortenaer."

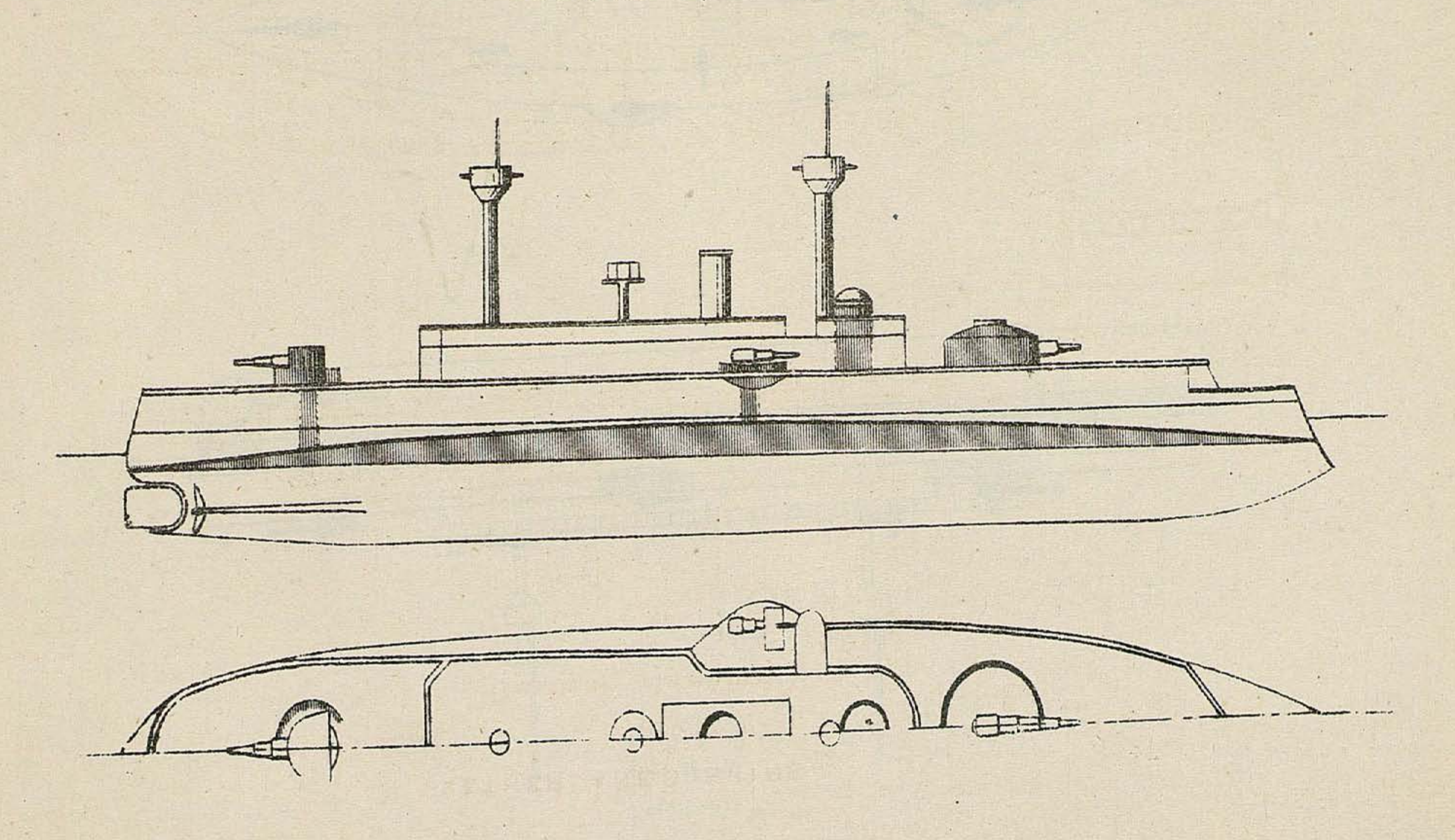




HANHART LITH

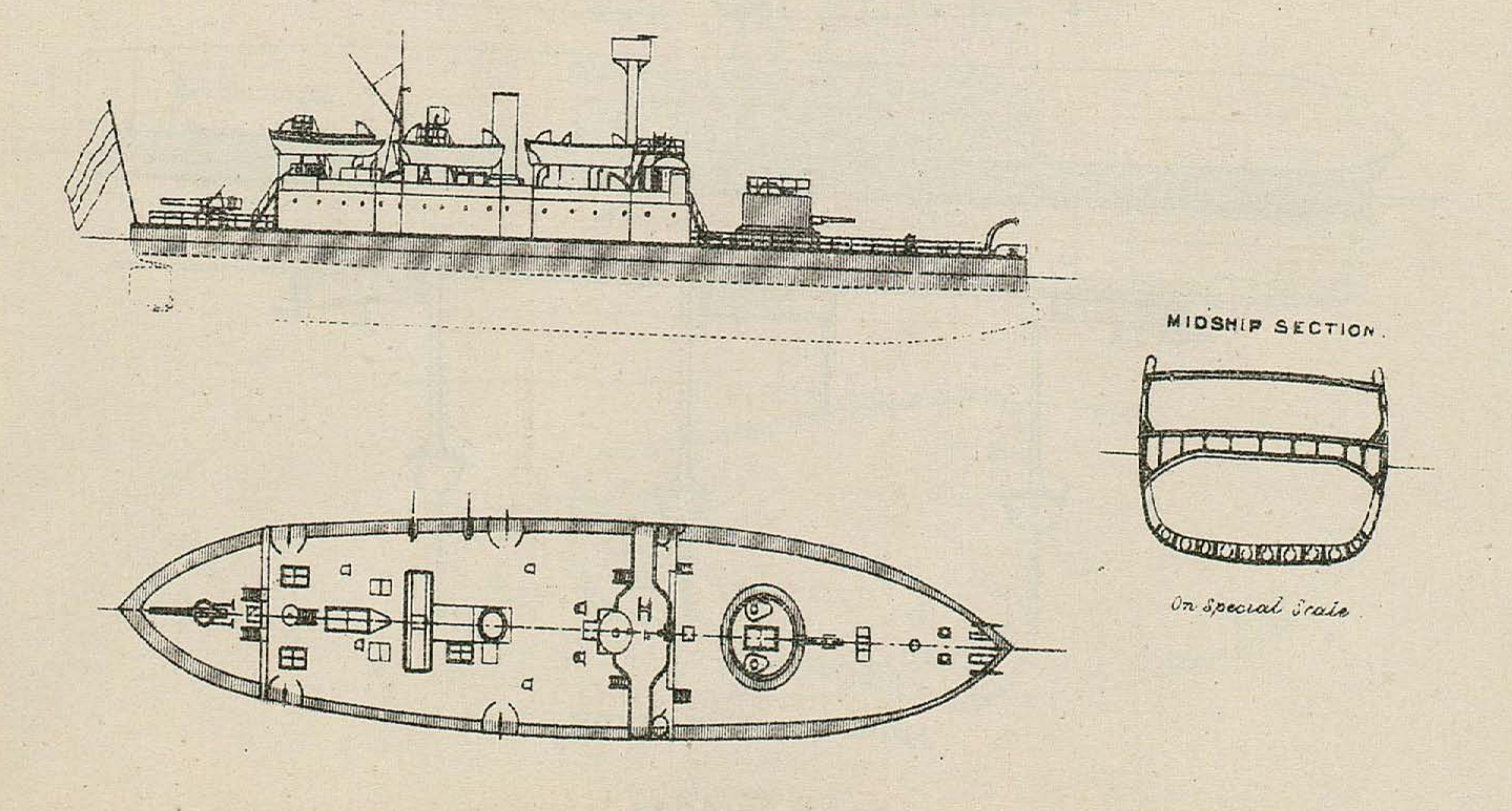
NETHERLANDS SHIPS.

"Princess Wilhelmina.



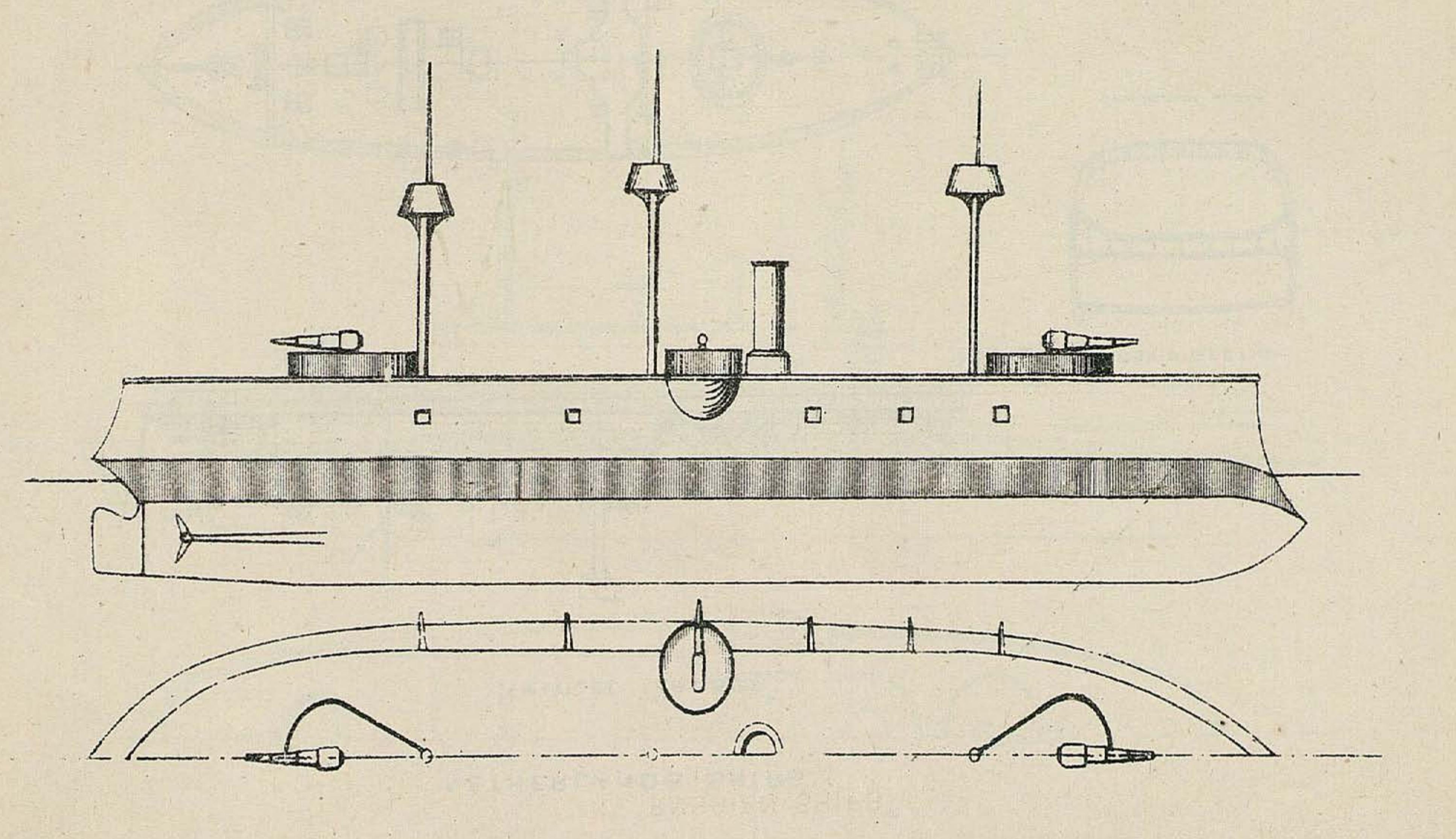
NETHERLANDS SHIPS.

"Reinier Claesen".

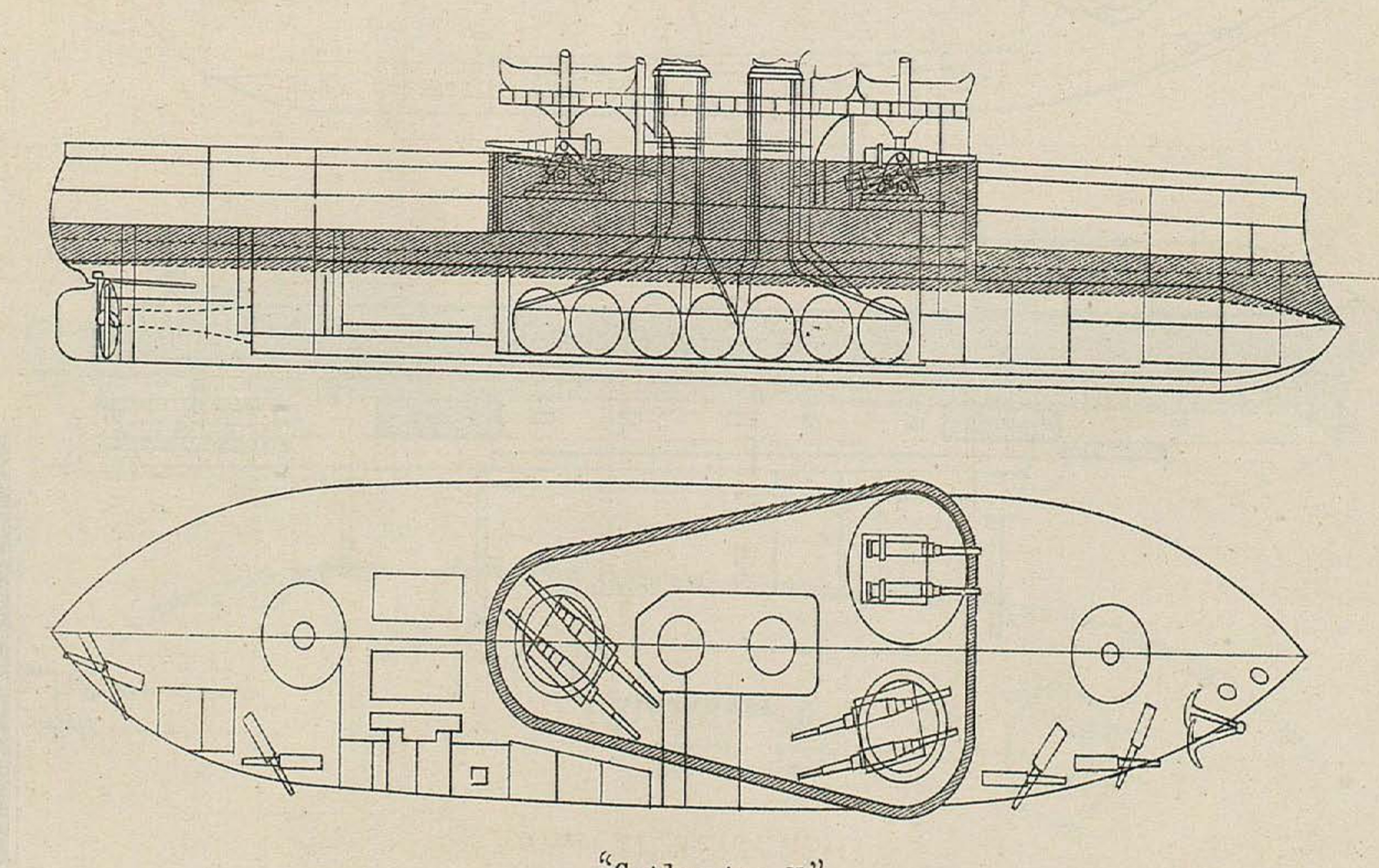


RUSSIAN SHIPS.

"Admiral Nachimoff".



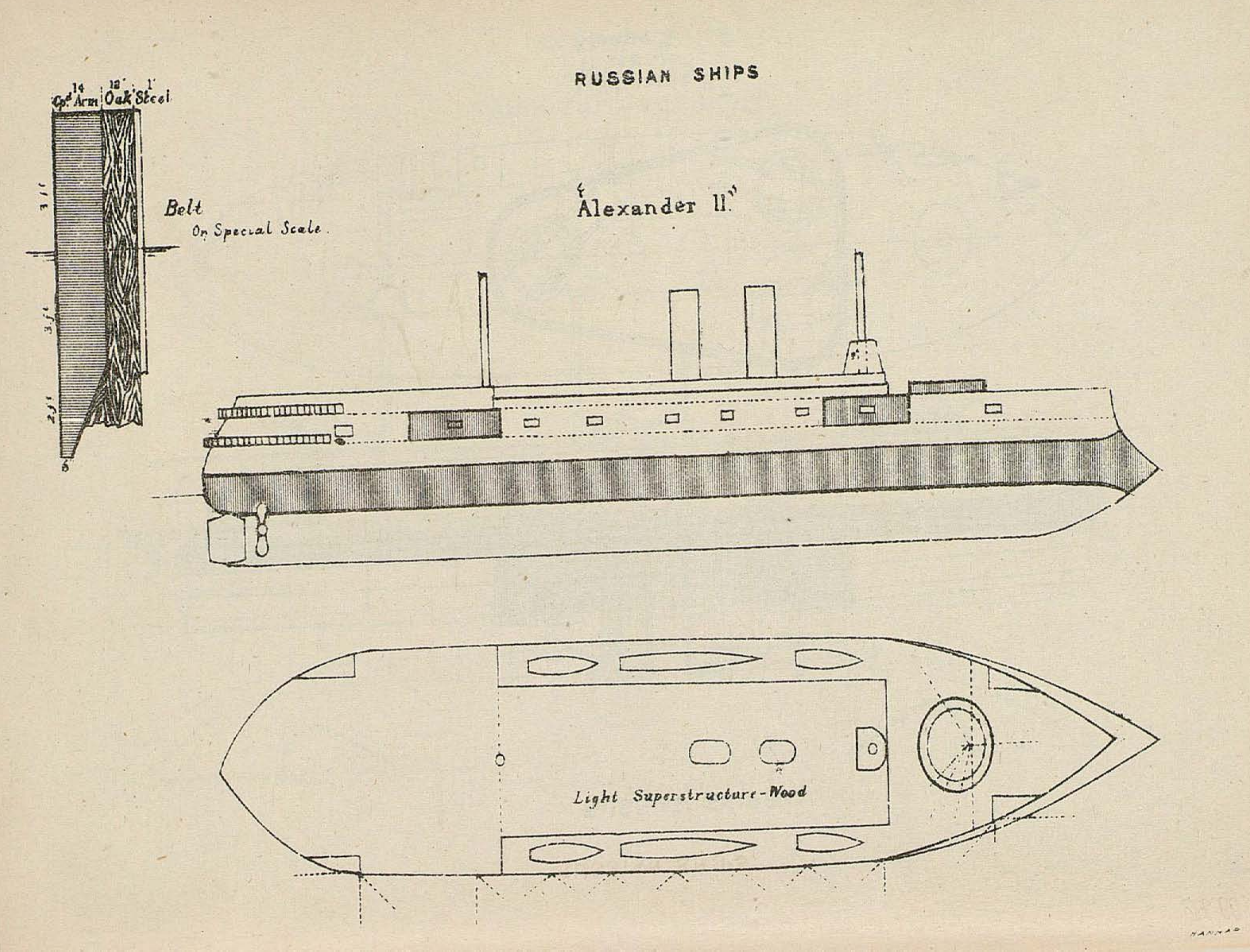
RUSSIAN SHIPS.



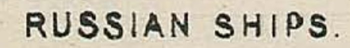
"Catherine II".
"Tchesme".
"Sinope".

RUSSIAN SHIPS

"Alexander II"

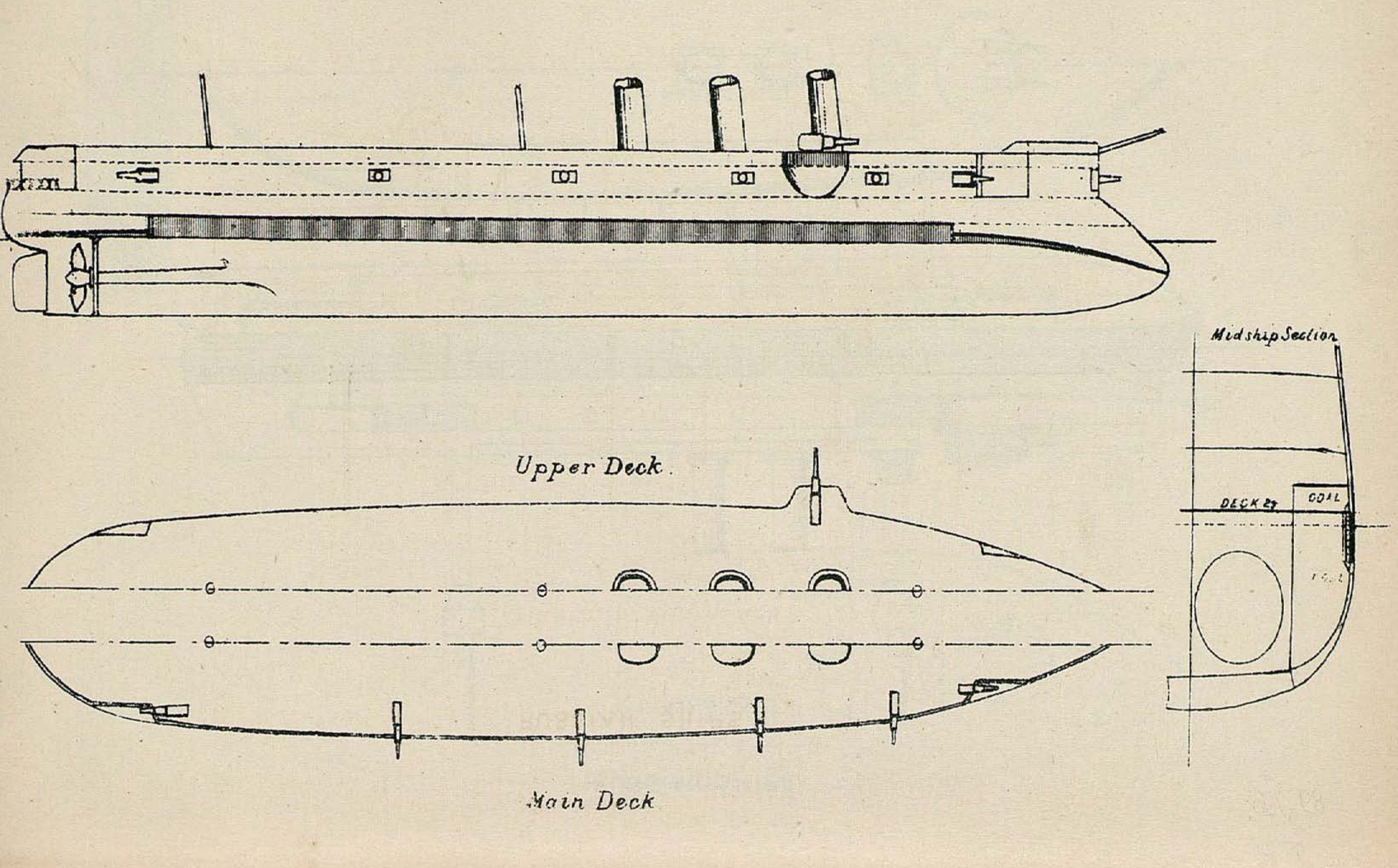


RUSSIAN SHIPS.



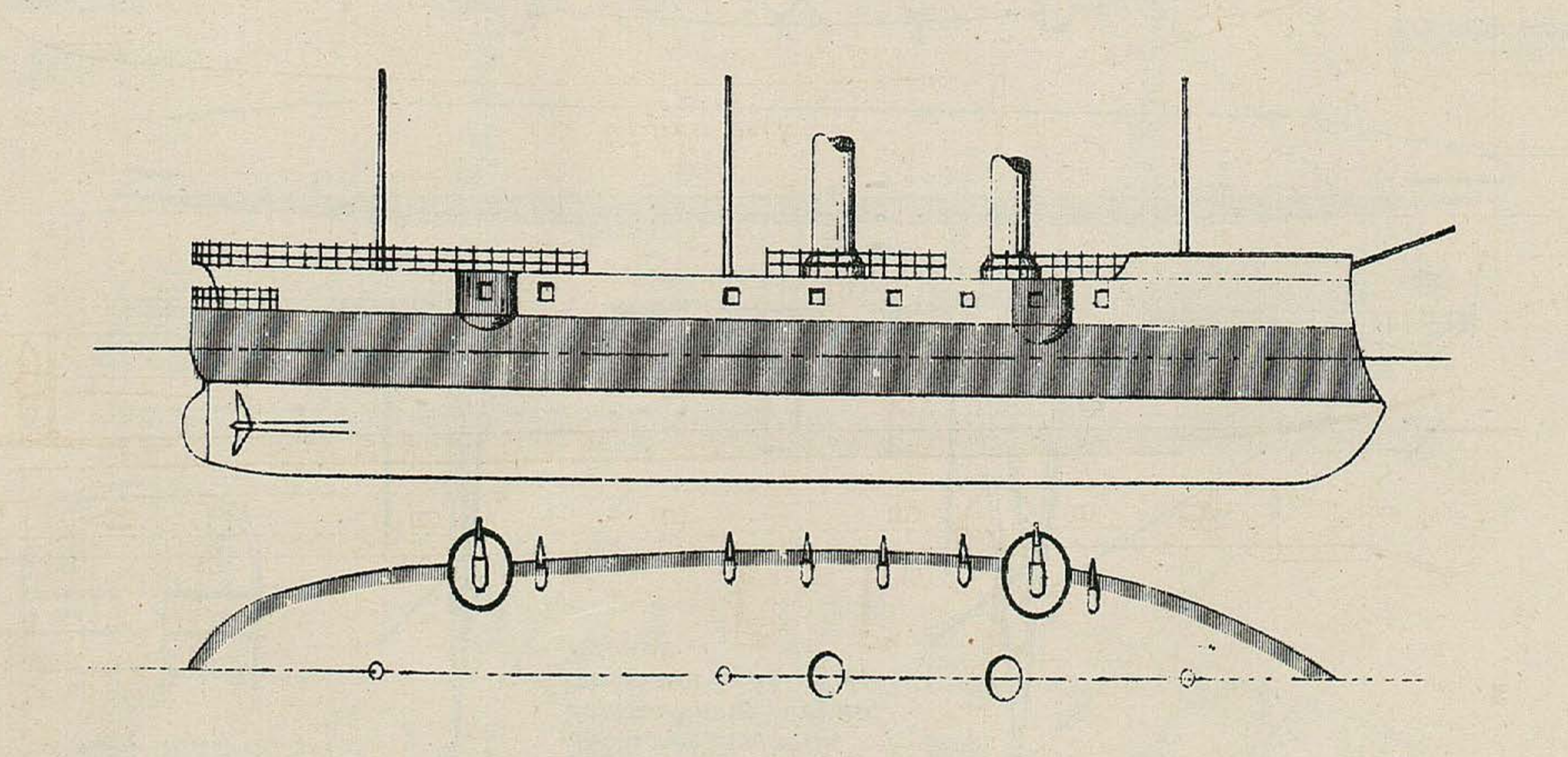
Nicolai I.

"Pamyat Azova".



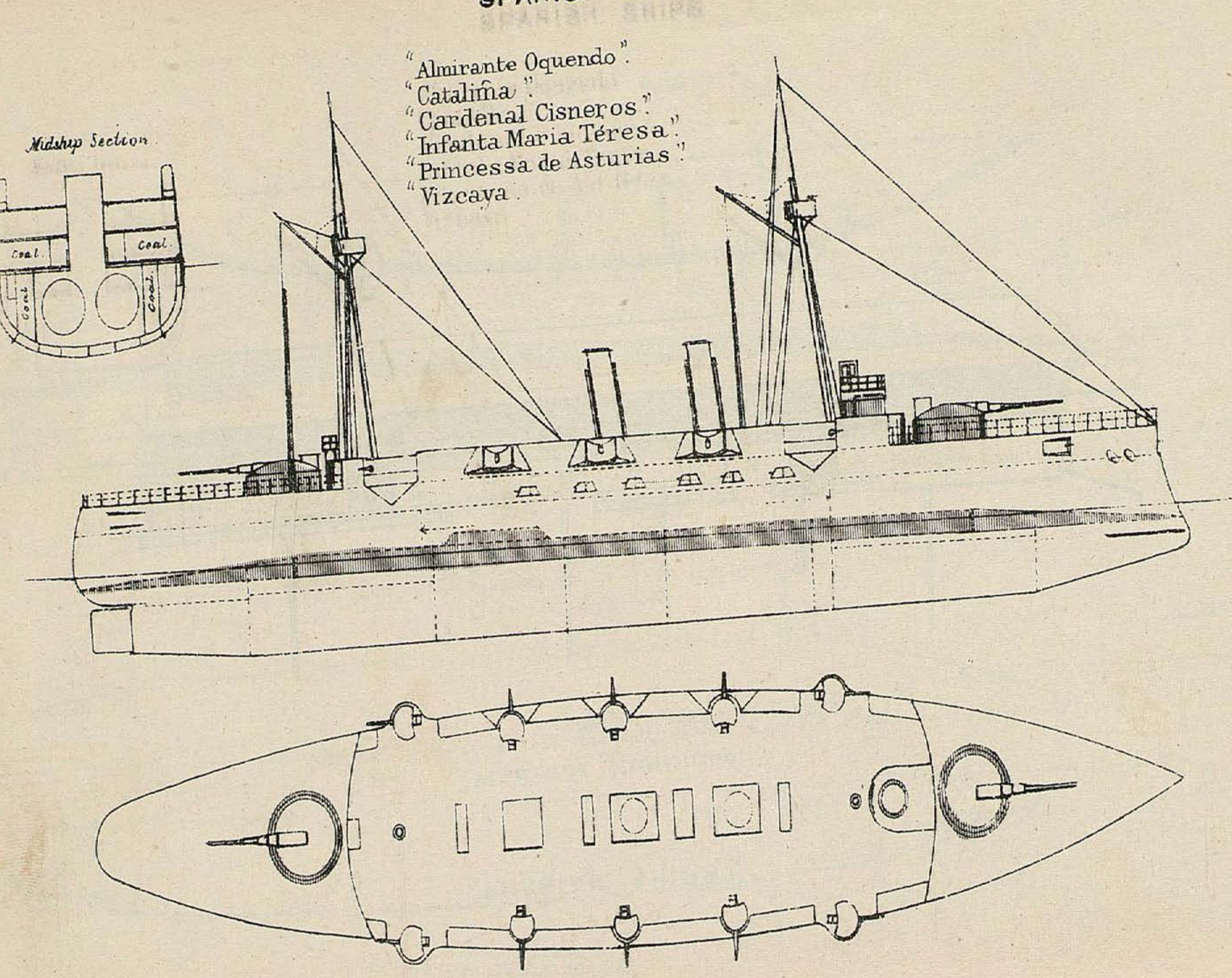
RUSSIAN SHIPS.

"Vladimir Monomach".



SPANISH SHIPS.

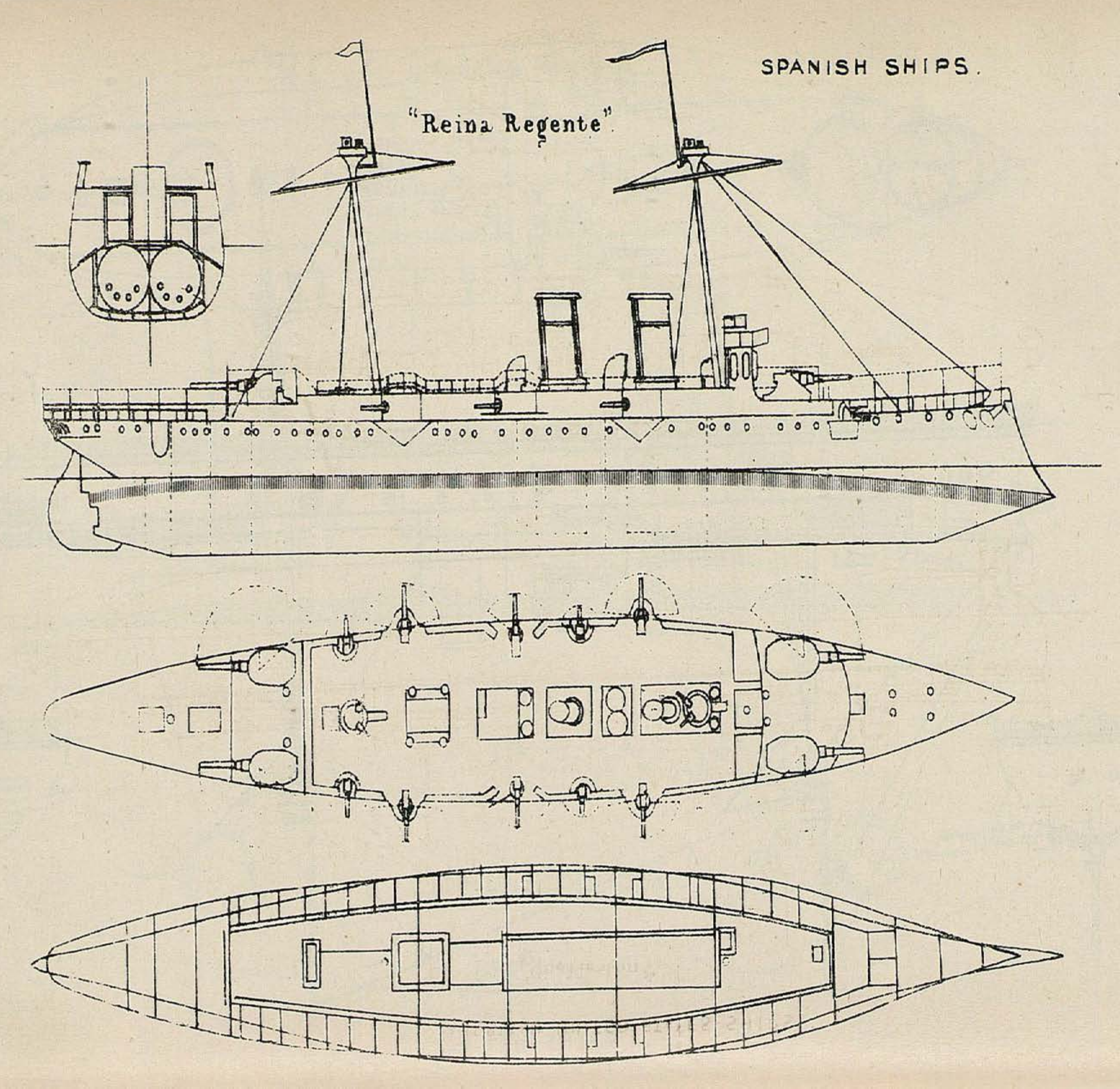
"Almirante Oquendo".
"Catalina".
"Cardenal Cisneros".
"Infanta Maria Téresa".
"Princessa de Asturias".
"Vizcaya".



"Pelayo"

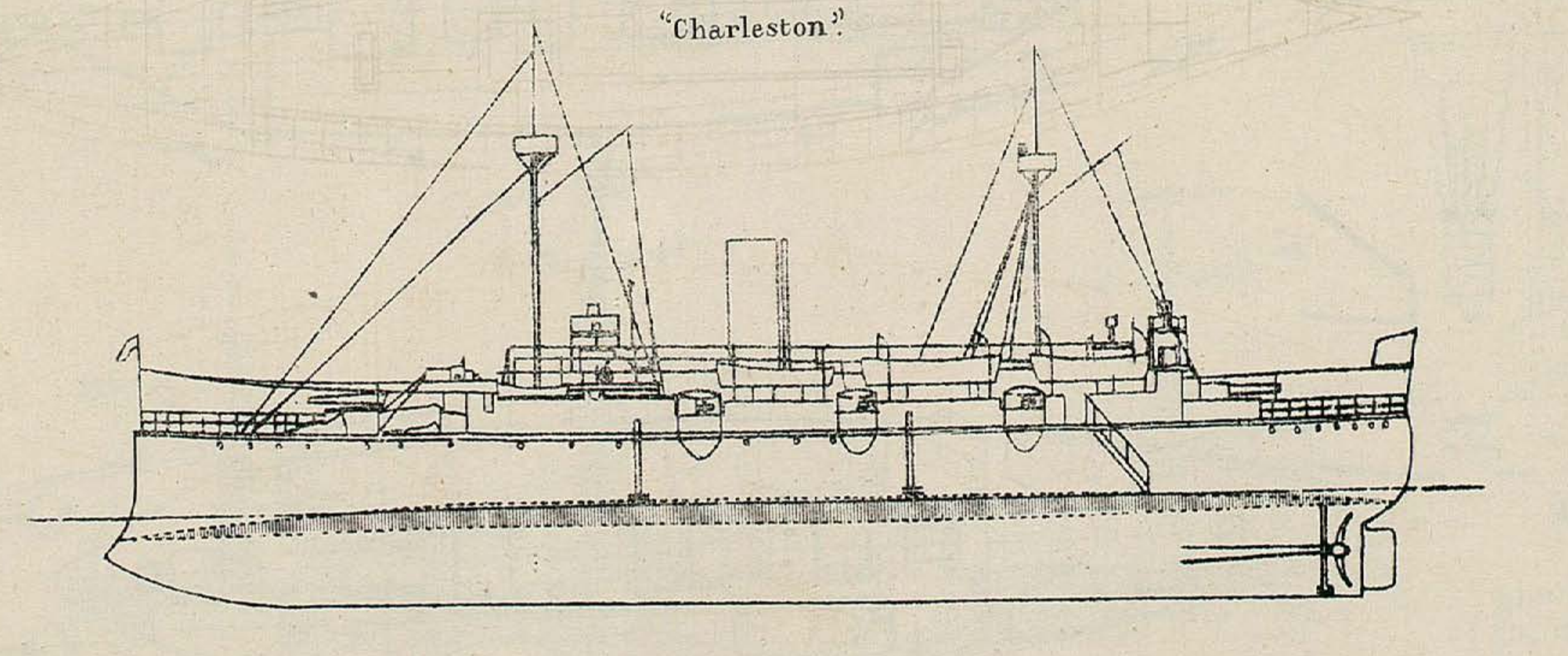
TANNART LITH

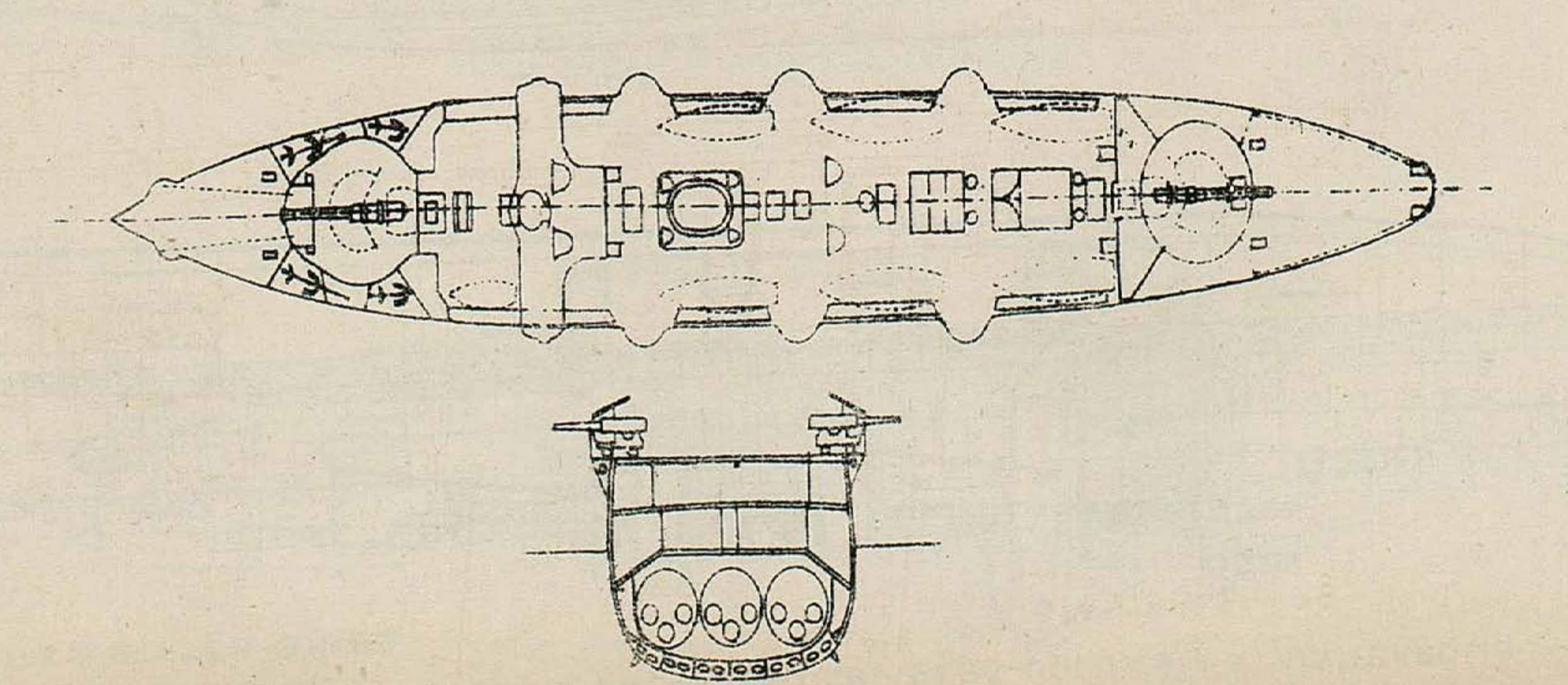
"Reina Regente".



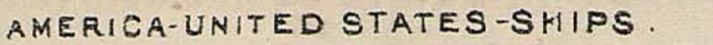
AMERICAN-UNITED STATES-SHIPS

"Charleston."





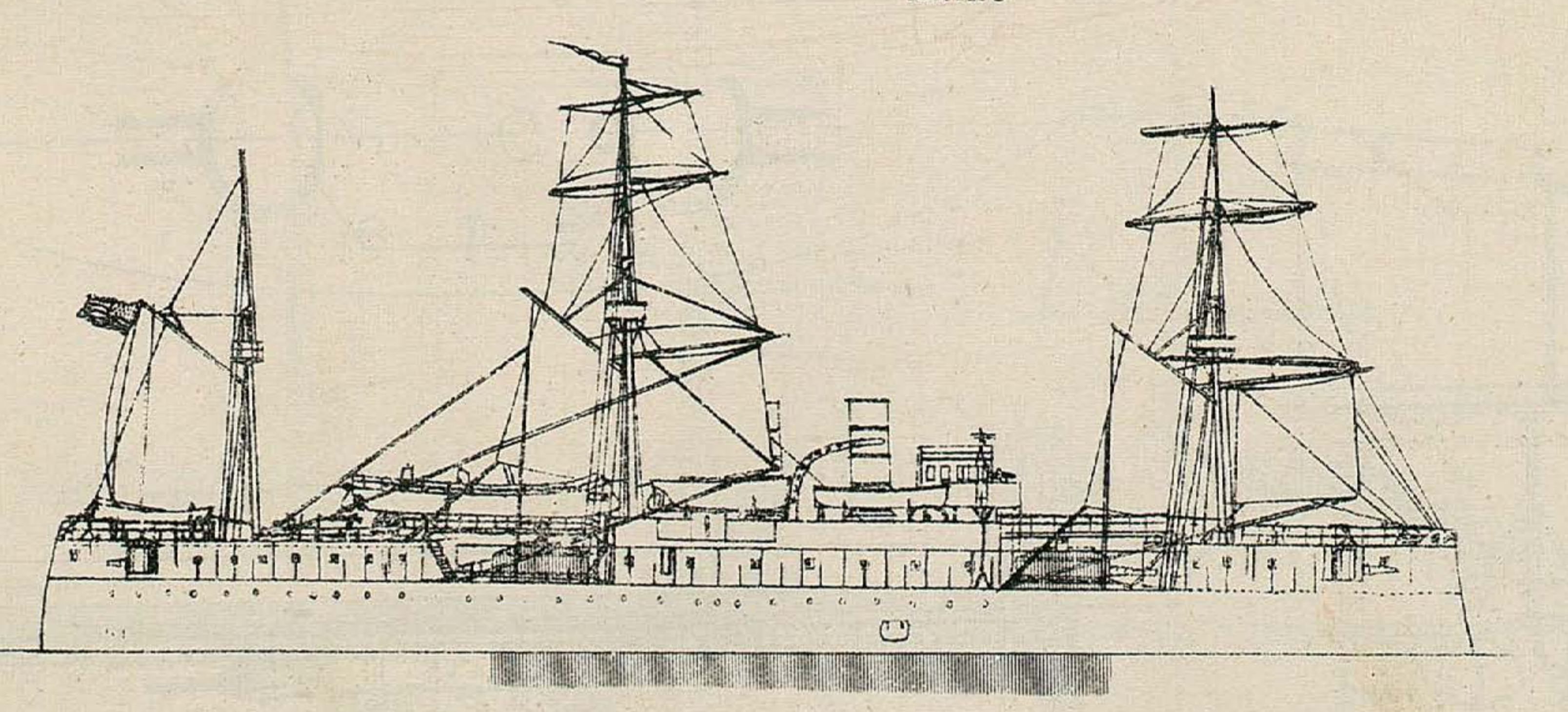
US. TRIPLE SCREW PROTECTED CRUISERS COLUMBIA & MINNEAPOLIS.



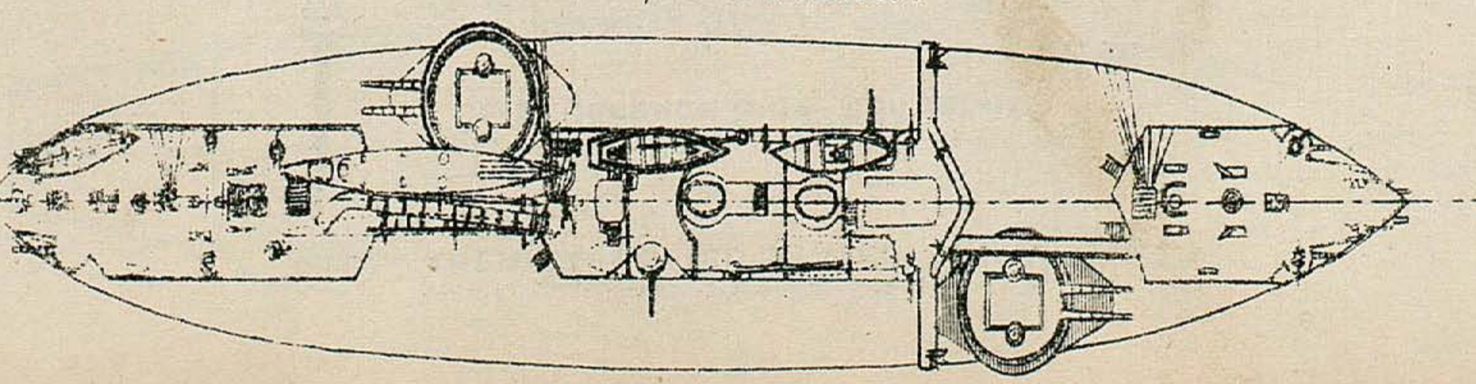
AMERICA-UNITED STATES-SHIPS.

AMERICA-UNITED STATES-SHIPS

Armoured Cruiser "Maine"

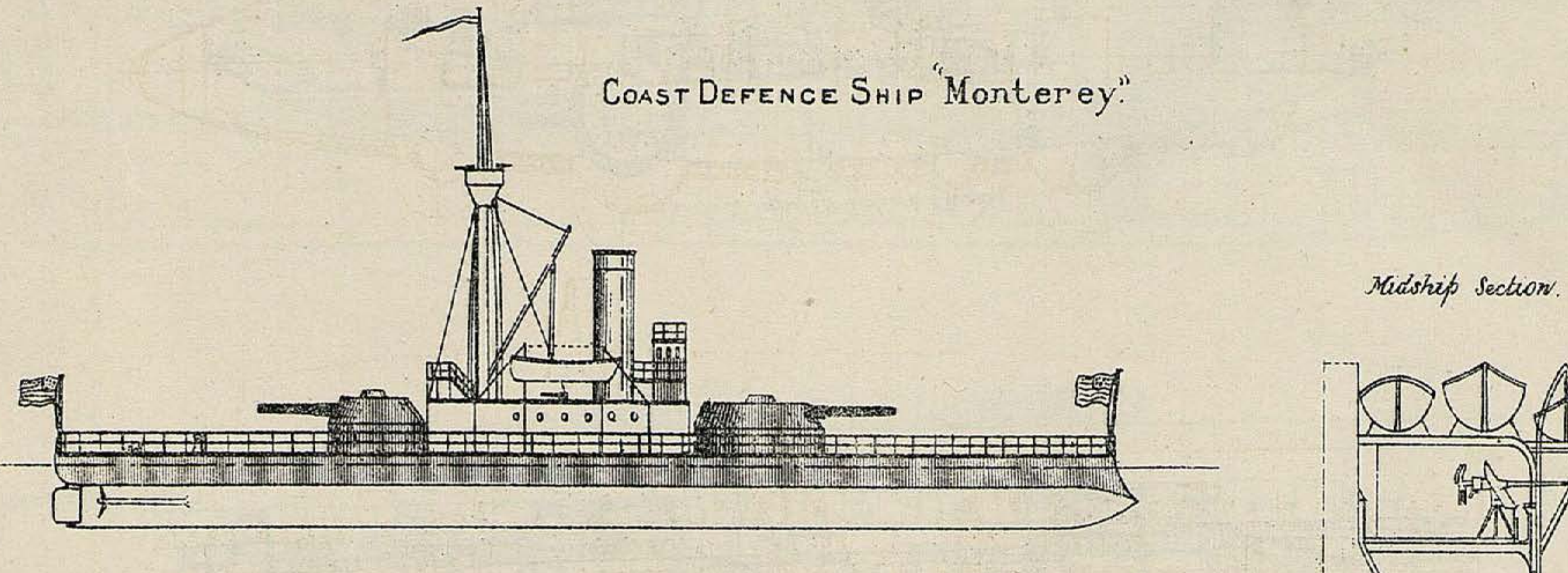


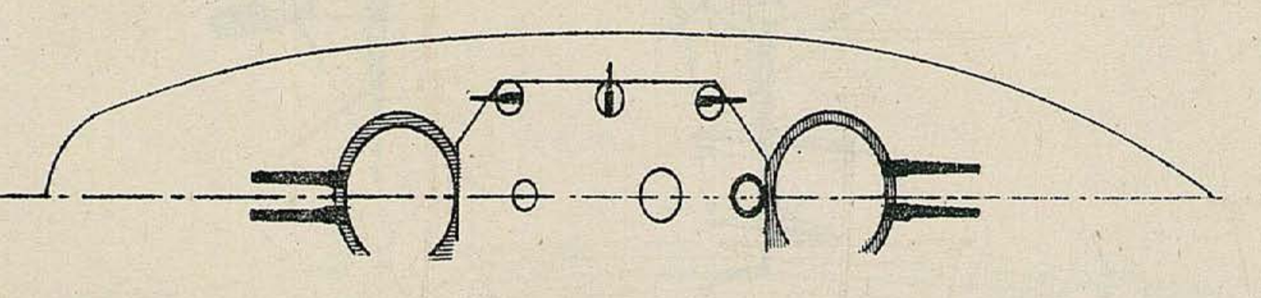
Main & Superstructure Decks.



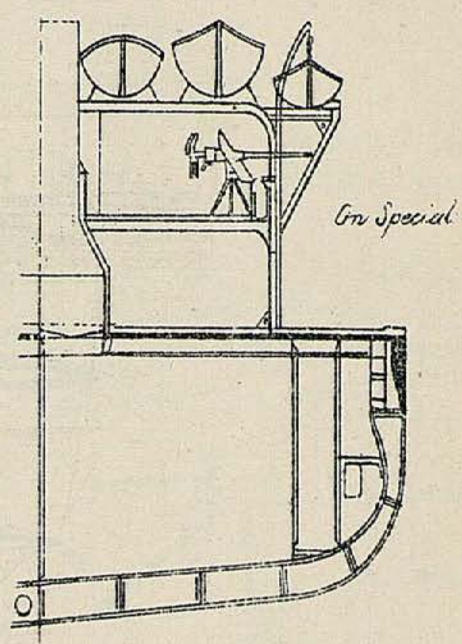
AMERICA - UNITED STATES - SHIPS.

Coast Defence Ship "Monterey."



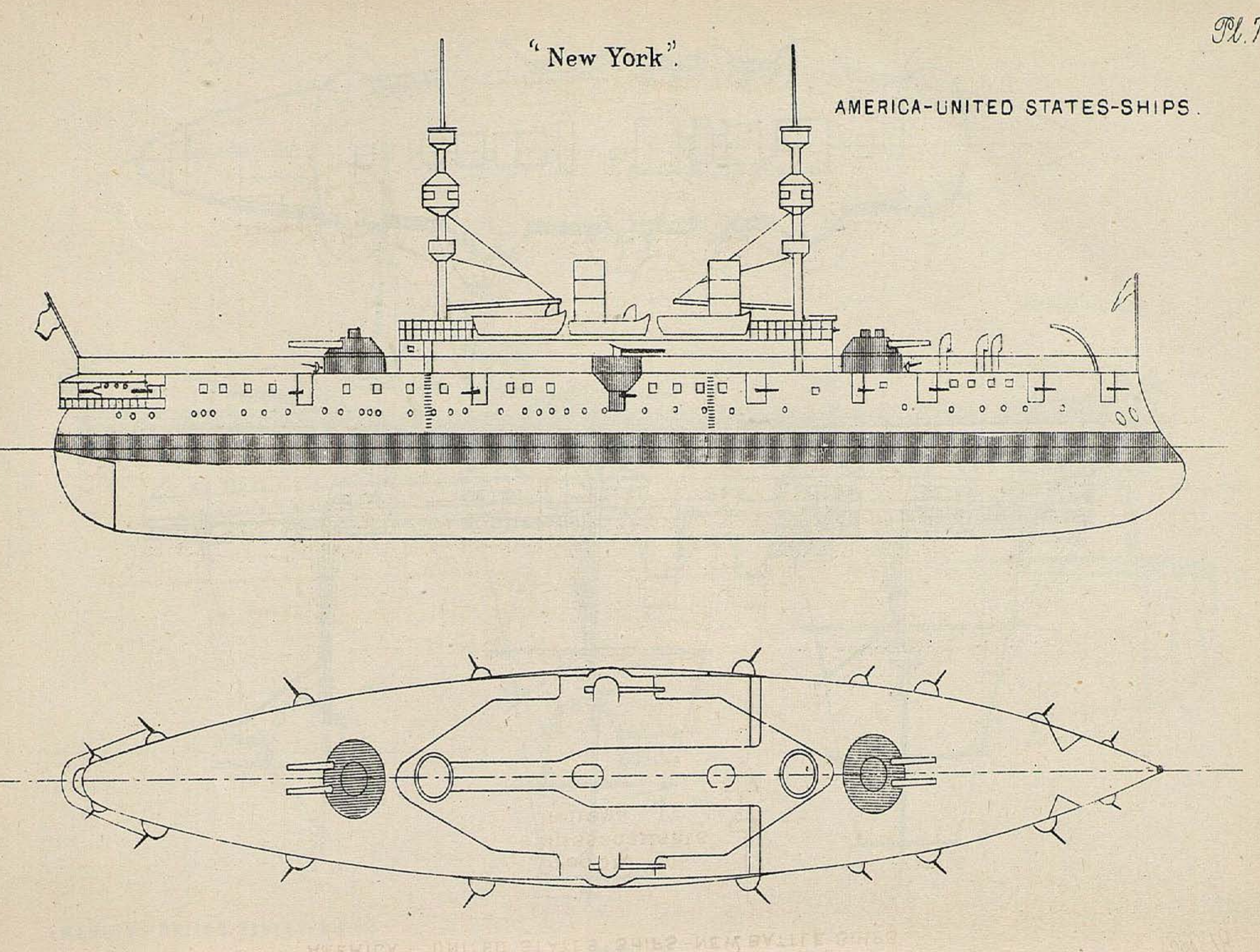


Midship Section.

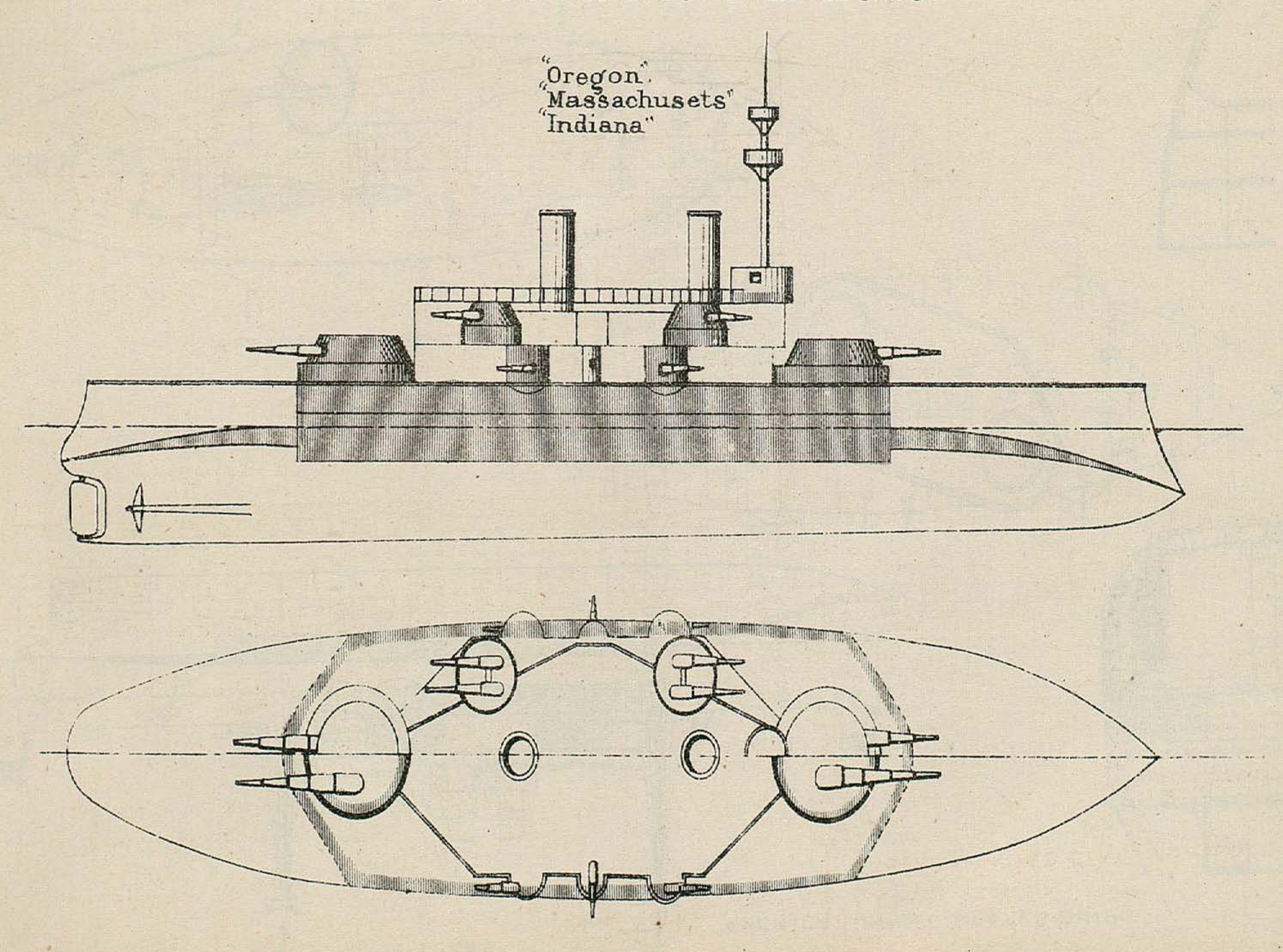


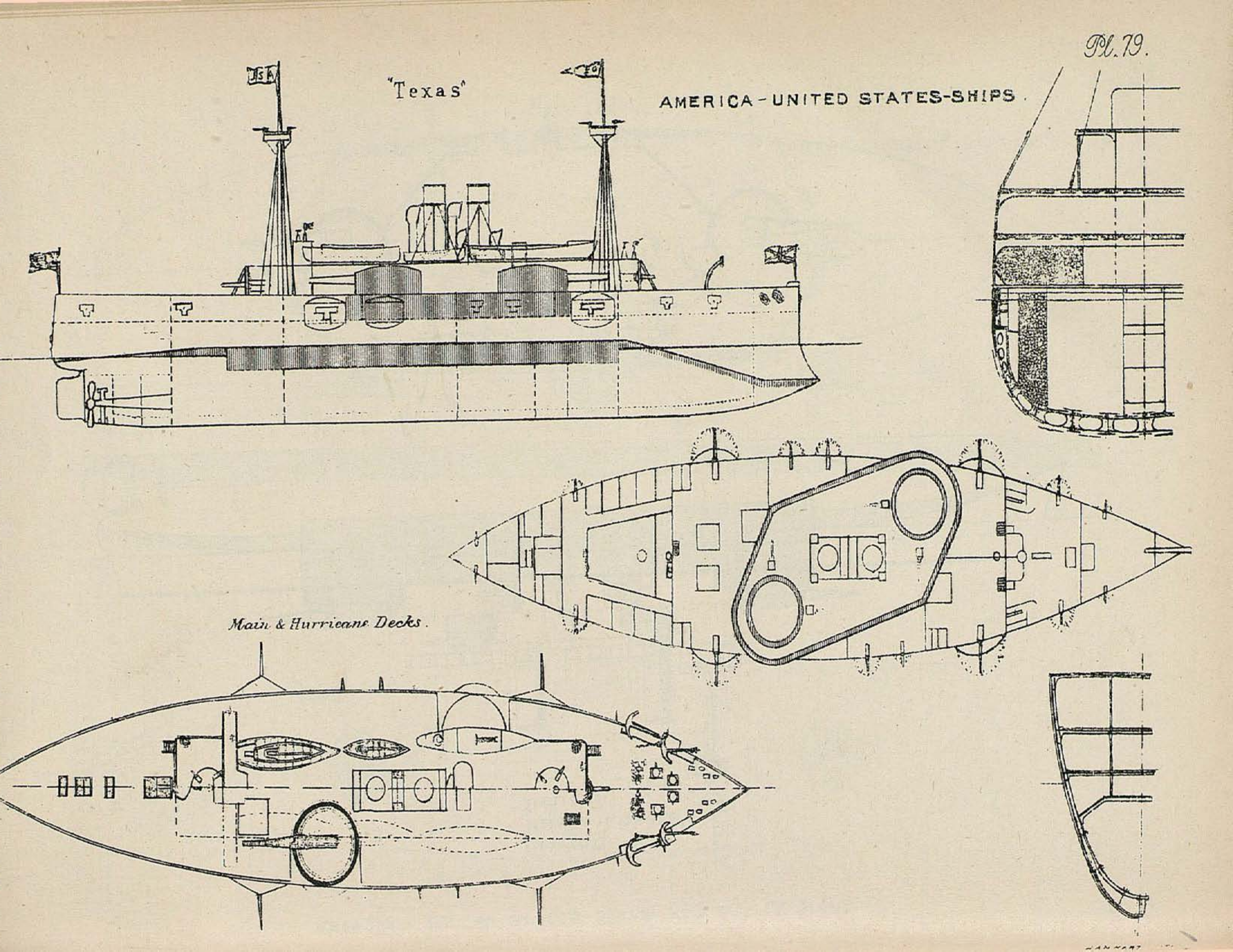
On Special Scale

"Newark"


"New York".
AMERICA-UNITED STATES-SHIPS.

AMERICA — UNITED STATES SHIPS - NEW BATTLE SIHPS.




Pl. 79.
"Texas"
AMERICA - UNITED STATES-SHIPS.
Main & Hurricane Decks.

PART III.

ARMOUR AND ORDNANCE.

PART III.

Armour and Ordnance.

I.

Armour Applied to Ships.

The methods of application of armour to ships is to many a question of greater general interest than the actual behaviour of the plates themselves. During the last few years changes have been made which come under the former heading and which involve new principles and call for special attention. The growing power of projectiles seven or eight years ago led to the increased use of thin steel plates to keep out the common shells of quick-fire guns. In France, the Dupuy de Lôme was the expression of this effort in the simple form of a cruiser with its sides covered by 4 in. of armour. This can hardly be commended, seeing that the plate is too thin to keep out any but very feeble shells. At short ranges, even the steel armour-piercing common shells of the 4·7-in. quick-fire gun would pierce such armour directly. In England, another principle has been adopted, which admits of application both to the case of heavily-armoured ships and of cruisers. This may be described as the double shield principle, the projectile being broken up or nearly stopped by a first shield, and the fragments, or nearly exhausted shell, turned aside by a second shield. One example of this is found in the curved protective deck when used in conjunction with side armour. Formerly, a horizontal armoured deck was constructed at the upper edge of the armoured belt. This seemed to be its natural place, as it there protected from descending blows all that region which was behind the belt, and thus defended the maximum bulk possible from attack. Since the penetrative power of projectiles has increased, the armoured protective deck has been curved or bent downwards to meet the lower edge of the belt; consequently, any projectile passing through the armour belt does not, as on the former system, find itself inside the vital parts of the hull, but on the upper side of the inclined protective

List of Authorities.—The *Engineer*, for both plates and matter; direct correspondence with manufacturers; personal attendance at Indianhead trial and also at Chicago; and the *Times*.

deck, which is likely to turn it upwards, seeing that it has expended most of its energy and may even have lost its true direction or be broken up. The same principle is carried out in another way by the use of steel traverses or partitions to shield guns' crews from the splinters of shells which burst in the ship. In American vessels, this has taken the form of a double circular wall of thin steel round the gun position, with radiating partitions or connections from wall to wall, such as drawn in plan, would resemble the cross-section of part of a segment shell. There are openings or doorways cut through walls and partitions. These are never exactly opposite to each other, in order not to allow a straight open path to a projectile or fragment. This system has the advantage of protecting the gun's crew from splinters from the surrounding hull, while it prevents the gun position from offering the appearance of a "shell trap." The advantage would be great if shells with long-time fuzes were likely to lodge in the gun position, but seeing that the action of gun she s with percussion fuzes is instantaneous, it may be questioned if the device is really useful except as offering men the constant means of passing through the shield.

War *matériel* in United States.

Several of the United States warships laid down during the last few years are now approaching completion, and every opportunity was afforded to officers visiting the country during the past year to inspect them; in addition to which a full-sized model, called the Illinois, was constructed on Lake Michigan at Chicago. Under these circumstances it may be desirable to review briefly the general question of war *matériel* in the United States, in order to see how it compares with that of Europe, and more especially with our own in England. Ten years ago any review of this kind would have been of comparatively little interest. After the close of the American War, a long period might be expected to elapse before money would be voted freely for any purpose of war. The ships and guns which had been developed during the struggle were the offspring of pressing necessity, and speed had been a leading element in their production. This had not led to the best possible designs and combinations. Nevertheless, American fertility of invention, under the pressure of a struggle such as was in progress, could not fail to turn out ships and guns of such powers as would more than suffice for ordinary requirements for many years to come. Hence it followed that for about a quarter of a century the United States very properly rested, to an extent that would have been dangerous for any other nation—except, perhaps, Russia. At length came the time of awakening; which resulted in the masterly steps that have been taken during the last few years, both in the matter of ships and ordnance.

Designs of ships.

To begin with ships. Accepting the conclusions that had been arrived at by those Powers who had been forced to push on continually, the United States authorities at once adopted types possessing the general features of such vessels as were most approved; for example, our Royal Sovereign class—that is the 1889 design. Profiting by drawings giving all the necessary details, and even employing men who had been engaged in England in working out the designs, it was found feasible to spring, without a single false step or disappointment, to the very front, and to work forward so as rival those who had offices and dockyards full of all that hardly-bought experience had furnished. It was obviously feasible, but not by any means easy to command success in the striking way in which it has been achieved. The United States authorities are then to be congratulated—first, on the judgment that chose the line to be taken; and next, on the constructive ability and energy that was displayed exactly in the most profitable way. It naturally follows from what has been said, that anyone would search in vain in the American fleet for such types as were developed in the twenty years following the close of the war in 1865. No mastless sea-going Thunderer or Dreadnought, no Inflexible or Italia, no Monarch or Duperré is to be found in the United States Navy. In one tremendous stride, the United States constructors pass, with hardly an intermediate step, from the small coast defence Manhattan, with her 2100 tons displacement and 19-ton smooth-bore guns, to the modern ship with the powerful quick-fire armament and steel armour. This much may be said in general, but the interest mainly commences from this point and lies in the question, How have the United States authorities worked forward? Where there is so keen an appreciation of anything that is found already well done, it is doubly interesting to see what departures are made from European models.

Apparent advantage of United States designs.

Any one taking up, say, "Lloyd's Register" or this "Annual" will be struck, perhaps even considerably perplexed, by the fact that for a given displacement, America appears to have secured startling advantages compared with the European navies. A cautious man would naturally question whether some distinct sacrifice must not have been paid for the advantages apparent in armour and guns; but he will scarcely find any facts to support his supposition in any published tables. An American reader would probably end by being highly satisfied with the results of an examination of the published data of similar classes of ships; and, before attempting an explanation, it may be well to give a comparison of a startling character between two cruisers. The English Blenheim of 9000 tons was launched in 1890, and may be compared

with the United States New York of 8150 tons, launched in 1891, apparently in some respects to the disadvantage of the former. The Blenheim has no side armour, being only "protected"; the New York has a 4-in. steel belt, and 10 in. of armour on her turrets. The Blenheim carried two 22-ton 9·2-in. guns, and ten 5-ton 6-in. guns, now to be replaced by 6-in. quick-fire guns; the New York, six 8-in. guns. The Blenheim has sixteen 3-pounder quick-fire guns, as compared with twelve 4-in., eight 6-pounder, and four 1-pounder quick-fire guns as the secondary armament of the New York. Hitherto, then, the superiority in the primary armament of the Blenheim was more than overbalanced by the New York's tremenduous power of quick-fire, as compared with the 3-pounder quick-fire guns of the Blenheim. The Blenheim's speed is, however, given in tables as 21·6, and 22·5 has been attained, while that of the New York is 20 knots. The Blenheim is shown as having greater coal capacity, enabling her to steam at 10 knots for 15,000 miles, against the 13,500 shown for the New York. Nevertheless, the American ship with her armour appeared to have some advantages over the Blenheim with her late armament, and compared still more favourably with the Blake, which was the vessel which naturally attracted attention, on her visit to New York last summer. Now these facts and their explanation illustrate the character and intention of the United States designs. In England there is every opportunity of attacking the plans and features of our war-ships in Parliament, but no attempt is made to dictate the conditions to be fulfilled in future ships. In America the House goes further, everything is more subject to public control, consequently it is necessary to satisfy the portion of the public who take an interest in the naval programme, that a good result is being obtained for the money spent. Americans expect to see that their new ships "whip" anything that is yet out, and a popular administration will take care that they are not disappointed. Hence we may generally look to see American ships carrying more powerful armaments and heavier protection than those of other nations, and any price that is paid for this must take some form not visible to ordinary inspection—it must not appear on paper. Such a price is necessarily paid, although it does not appear. Now, in saying this, it is not implied that the United States designs are bad in any way, or that there is anything dishonest or deceitful about them. We ourselves in England are subject to the same influence, though in a less degree. It is probable that our own technical advisers would never have mounted 110-ton guns on our ships if we could have braved the charge of inefficiency to which we should have been exposed when Italy continued to turn out her long series of ships

carrying 100-ton guns—the Duilio, Dandolo, Italia, Lepanto, Lauria, Doria, and Morosini. Our own public would never have been satisfied that England could rule the waves with dignity and honour in the presence of such a fleet of ships carrying heavier metal. The Benbow, Victoria, and Sanspariel, with still heavier pieces, supplied the answer, which would be most directly and easily understood. So with America; the obvious conditions which are appreciated must be fulfilled at the expense of others unseen and unappreciated, presumably those that can best be sacrificed, and possibly such as are of less importance to the American fleet than to the British.

Explanation of.

To begin with, the American ships being intended for coast defence have low free-boards and much less weight of hull than our sea-going ships. Next, the supply of ammunition is not shown, and it will be found that the British ships carry a very much larger quantity than the American. The latter may be supposed to be within easier reach of ammunition than the British ships, and to require less coal. Then we have laid special stress on the application of armour to the insulation of each gun position, and the protection of ammunition from the shell room to the very breach of the gun. More than this may seem to be required to account for the difference before us, but it may be pointed out that nations have made their own experiments as to the effect of shell fire on structures, and that such experiments have been, on the one hand, very important, and, on the other hand, they have been confidential, so that it is exactly the branch in which we can least show results for our money. This principle applies to the case of the Blake and New York. The latter is an armoured cruiser, doubtless, for she carries side armour, which is good as far as it goes, but it is applied in a very incomplete way. Her side plates leave off abruptly without any longitudinal or cross defence. A shell bursting beyond the end of the side armour would act partly behind it, and an oblique blow might enter much as if there were no armour at all.

In short, then, the character of the American warships may be briefly described as follows: They have been based on the best and most advanced models, they have been skilfully adapted to possess enormous powers of both attack and defence, but at the cost of elements which, while they do not appear in published lists, are such as are considered to be of great importance in Britain. It is conceivable that American constructors and British constructors may both be right. Each may be dealing with the conditions required by their respective countries, but in justice to England it is right to point out, as far as may be, how the case stands.

Armour and guns.

Passing on from the general question of the characteristics of the United States warships to the subjects of armour and guns, we find the same principles applied and with the same ability. The policy recommended by the board of officers who visited Europe in order to arrive at the system best suited to the conditions of the United States has been consistently carried out. That is to say, the manufacture of all war *matériel* has been taken in hand in the States on those European patterns and methods that appeared to be best. Solid steel armour was copied from Schneider, and in the case in which most notable success has been achieved, it has been made on his plan of hammering in preference to rolling. Gun steel was made in hollow cylinders on Whitworth's system of fluid compression, but while the aid of the European establishments referred to was invoked and fully acknowledged in starting, such progress has been made that it may be seriously questioned if Schneider could successfully compete with Bethlehem at the present moment. Few plates have even now resisted successfully an attack equal to that defeated by the Bethlehem-Harveyed plate exhibited at Chicago, although Krupp exhibits a plate that has defeated a single blow of greater severity than those which fell on the Bethlehem plate. In our own country Vickers, and subsequently both Brown and Cammell, have, no doubt, produced plates which appear to be of the same excellence as those of Bethlehem, and it is due to them to observe that it may be only owing to the circumstance that their plates were tested to destruction at Ochta and Portsmouth, that they have not at the present moment a plate like the Bethlehem one above-mentioned, that is one that has been attacked up to the full measure of its extraordinary resisting powers without overtaxing them and so destroying the plate. Both Brown and Cammell have recently submitted steel Harveyed plates of extraordinary resisting power for trial at Shoeburyness. We have also reason to believe that we have obtained certain distinct advantages in discarding nickel in the case of Harveyed plates. This, however, in no way invalidates the statement as to the lead taken by Bethlehem, for the remarkable success referred to was first achieved with the Harvey process at Bethlehem, and Europe has followed suit. To Schneider belongs the credit of introducing nickel into steel, but so well has this been carried out in the United States that at the present time it may be questioned if their examples of successful nickel-steel plates do not fully rival those of Europe. The most advanced and powerful plant for manufacture of steel forgings and armour, including the heaviest hammer existing, is to be found at Bethlehem, while rolling mills and still more extensive, though in some respects less powerful, means of manufacture are found

at Carnegie's works near Pittsburg. The ability referred to has not been limited to success in processes of manufacture; it is seen in the system of control established by the Government, and its bearing on ordnance as well as armour may be here mentioned. It was decided from the first that private firms should be encouraged to develop resources on which the country could depend for the supply of elements or component parts of guns, while the Government establishments should confine themselves strictly to the work of a gun factory—that is, to finishing and building up the elements supplied into finished guns. This has been successfully done. We hear of no accidents, few disappointments. In the lists of ordnance published for different countries in such works as this "Annual" the United States for some years appeared with a long list of guns, existing only on paper. Gradually, however, the finished took the place of the paper guns, and no appreciable corrections had to be made in the figures showing their powers. The 12-in. gun, shown as estimated for in the "Annual" of 1887, has a muzzle velocity of 2100 ft. per second, and an energy of 25,984 foot-tons. The actual 12-in. gun given in the "Annual" for 1893 has the same, except that incidentally one foot-ton more energy is shown. For armour a system of examination and testing has been organised, which appears to be more thorough than any carried out elsewhere. As yet, probably all nations stand in somewhat the same position. Supplies of thin plates have been well tested, while thicker ones have been found more difficult to deal with. In the United States the delivery of plates of 17 in. is only commencing, but it is commencing under a very searching system of examination and tests. There may, doubtless, be faults, indeed, some Carnegie plates have recently been discovered which had been tampered with after selection for proof. There however is much to commend; nor is it to be wondered at. The conditions are singularly favourable. The United States is a great Power, with unlimited resources. She is free from the pressure of the haste which is engendered by the danger of delay. She has men of notable inventive powers, coupled with the discernment to seize and apply anything good that already exists, with access to the results of experience acquired by other nations, and she has as much money as may be wished for. It is difficult to conceive circumstances more promising. Surely, if success does not follow, it could only be owing to gross corruption, flagrant neglect, or perversity.

A discovery has been recently made of systematic deception with regard to the treatment of Carnegie plates, but no evidence exists of actual bad quality in the armour delivered.

Armour Plate Trials.

The hard face given to steel armour by the Harvey process has maintained its power to defeat the best projectiles at high velocities almost invariably fracturing their points and causing them to break up, the head commonly remaining embedded in the face. The Harvey process having proved its powers in the United States, and having been taken up in this country by Vickers, other Sheffield makers acquired the right to use it, together with any features covered by the Tresidder patents, while Krupp and Schneider have hardened the faces of their steel plates by some analogous processes with good results,* so that in different ways the value of Harvey's invention has been well established. It must not, however, be supposed that all difficulties are at an end with regard to hard-faced plates, until ships are seen with such plates curved and fitted on their sides. The difficulty of contortion, due to water hardening, has certainly not been yet overcome on a large scale. Samples have, however, been produced in this country which give every promise of success, while in the United States Harveyed plates have been successfully supplied for the Maine.

Harvey process. The features characteristic of the Harvey process are the application of carbon † at a very high temperature for a long time, followed by water hardening. If the process of carbonisation can be extended to the depth desired for very thick armour, it must necessitate a very long continuance in a furnace, and this must involve difficulties, and special means must be employed to prevent the back of the plate from becoming soft. In the United States some hesitation is apparent as to the application of the Harvey process to very thick plates, while it may be here noticed incidentally that great difficulty has been experienced in drilling holes in the faces of Harvey plates. Both these difficulties may be due in a great measure to the presence of nickel. In England, it has been decided not to use nickel in Harveyed plates, because the resisting power against penetration is greater without nickel, although toughness is less. It also appears that nickel causes crystallization at a low temperature, and further, that high carbon steel containing nickel cannot be drilled even by the "arc light" process. It happens also that there is a great saving of expense in omitting the nickel, though this was not the reason for its exclusion.

Texel trials. With regard to velocity, it will be seen in the case of the Texel trials, that at velocities under 1600 ft.-secs. the hardened faces seemed to produce no effect, the penetration in the Vicker's plate,

* See Krupp's exhibit at Chicago, p. 377.

† The application of pressure has been spoken of, but it can hardly be said to be applied in practice.

which had the hardest face, being actually less than those in the St. Chamond plate, of which the face was not hardened at all, probably because the mass of the latter plate was made of harder steel. When the velocity exceeded 1600 ft.-secs., the shot broke on the Vicker's plate, while it passed clean through the St. Chamond plate. The limit is seen at the third shot striking at 1640 ft.-secs., which penetrated a short distance and broke to a limited extent in the former plate, and nearly perforated the latter. At the two highest velocities, namely 1772 and 1881 ft.-secs., the shot shivered, with little penetration, on the Vickers', and passed clean through the St. Chamond plate. While, however, the conclusions suggested by this trial are reasonable, they have not been borne out by trials in this country, and cannot be yet accepted.

Russian experiments.

An attempt was made early in the year in Russia to revive a plan which was first proposed in this country by Colonel English in 1878, namely, to protect the point of the shot from abrupt fracture when it first meets the hard face of the plate by fixing a cap of wrought-iron on the shot point. This has occasionally answered its purpose. It has saved the point from the sharpness of the shock, and has in some measure supported it, but it has proved to be a troublesome device. It is said that one Russian gun was burst by the cap escaping and then acting as a wedge in the bore of the gun. Prevention of this should have been possible; but, as at Shoeburyness in 1878, it was found last year in Russia that the results achieved were not to be depended on. It is believed also that when striking at an angle the wrought-iron cap is absolutely mischievous.

Another device has been tried in Russia, of which all details are at present kept secret. It is stated that it consists in the employment of very small projectiles of very excellent quality to break up hard-faced plates. This appears to be contrary to the principle suggested above, namely that the power of the hard face is best exerted against a projectile of comparatively small mass striking it at a high velocity. It is impossible, then, to offer an explanation, especially with the very imperfect information obtained. No doubt very small projectiles may be made of extraordinary quality, and fired in numbers from a quick-firing gun they might produce an unexpected effect; but no good purpose can probably be answered by speculating further on what is claimed to be a special Russian secret.

Nettle trials of Tresidder and Harvey plates.

A series of trials of 6-in. steel plates on board the Nettle,* under the attack of the 6-in. gun early in the year, completed the

* The results of the earlier experiments of this series were given in the "Annual" of 1893, p. 316.

victory of the Harvey process. The results were briefly as follows:—Vickers plates (Harveyed) offered about the same resistance to a shot striking at 1800 ft.-secs. as a Brown compound Tresidder plate to one at 1600 ft.-secs., while a Vickers untreated steel plate was perforated comparatively easily. Palliser projectiles were fractured, but perforated the plate, except at the low velocity of about 1500 ft.-secs. In mentioning this, the fact must be noted that the magnitude of the shot was disproportionate to that of the plate.

In the spring of 1893 a plate trial took place at Indianhead with a nickel steel plate, with a face hardened on the Harvey process, measuring 9 ft. by 7 ft. by 14 in. The importance of the experiment consists in the fact that the plate was much thicker than those previously tried. Four rounds were fired at it from a 10-in. gun firing a Holtzer projectile weighing 500 lbs. on each occasion. The

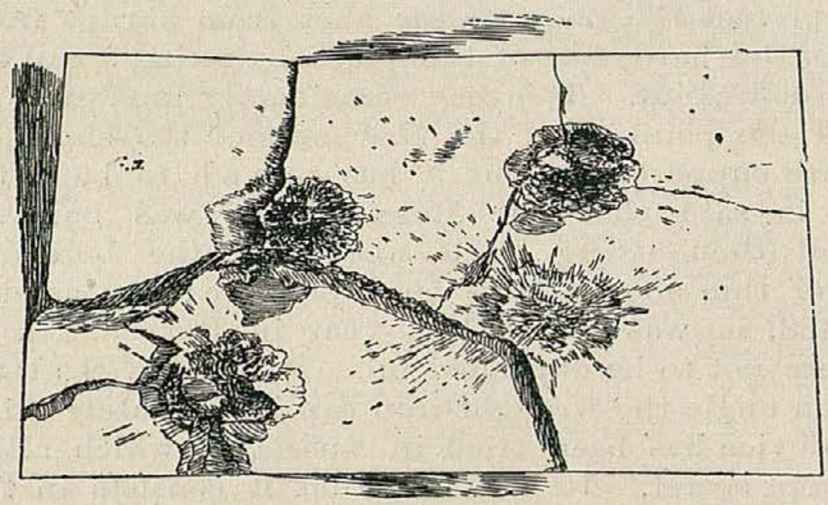


FIG. 1.

striking velocity, energy, and calculated perforation through iron or steel for each round was as follows:—

Round.	Striking Velocity. Ft.-Secs.	Total Energy. Ft.-Tons.	Energy per Ton of Plate. Ft.-Tons.	Perforation. Iron. In.	Steel. In.
No. 1 . .	1472	7513	469·6	16·2	12·9
„ 2 . .	1859	11,990	749·4	20·8	16·6
„ 3 . .	1959	13,300	831·3	22·0	17·6
„ 4 . .	2059	14,700	918·8	23·2	18·5

The condition of the plate after the fourth round is shown in Fig. 1. It will be seen that the plate was broken up, but it was not perforated, and no bolts were broken. The supporting structure was considerably crushed and shaken. The projectile was in every case broken, and the head left embedded in the plate, the maximum

penetration being estimated at about 11 in. The behaviour of the plate was admirable, for the attack greatly outmatched it, and it exhibited the same powers of resistance as the smaller plates similarly treated. The significance of the trial is discussed on p. 365.

On Tuesday, July 11th,* 1893, at Indianhead, were tested two nickel steel plates, with results shown in the accompanying figures, taken from the official photographs. **American nickel steel armour plates.**

Fig. 2 is a nickel steel plate manufactured by Messrs. Carnegie. It is 9 ft. 7 in. by 6 ft. $3\frac{3}{4}$ in. by 9 in., weighing about 10 tons. It was attacked by three 8-in. Holtzer forged steel projectiles, weighing 250 lb. each, with 1400 ft., 1683 ft., and 1543 ft. velocity successively. The second shot, with a calculated perforation of 11·6 in. of steel, perforated the plate, as was to be expected. It may be seen that the steel is excellent.

Fig. 3 shows the Bethlehem barbette shield 12 ft. 1 in. by 8 ft. $4\frac{7}{32}$ in. by 17 in., weighing about 31 tons. It was attacked by three 12-in. Carpenter forged steel projectiles, with striking velocities of 1322 ft., 1495 ft., and 1858 ft. successively. The last, which had a calculated perforation of 19·4 in. of steel, perforated the plate. In both plates the steel is excellent; the even complete fringe, so dear to steelmakers, is seen round each hole, and no trace of metal being detached is apparent. In both plates the resistance to fracture is complete, no cracks being apparent. In justice to the Bethlehem plate, it should be pointed out that, instead of benefiting by the larger projectile being of inferior quality to the smaller one, as might naturally be expected, the opposite turned out to be the case, for the 8-in Holtzer shot bulged round the centre in the two cases when it failed to perforate, while the Carpenter shot, which were excellent, rebounded undeformed. It may be seen that neither plate had a hardened face.

The interesting competition of armour plates, the general results of which have already been noticed, took place at Texel on August 23rd and 24th. The facts given below are taken from the official report, and the figures are reprints taken from the official photographs. All the best armour manufacturers in Europe competed, and that the behaviour of shot on impact against a hardened face at low and high velocities was investigated, and results were obtained which were hardly what could have been anticipated, though they admit of explanation. At low velocities under 500 m. (1640 ft.-secs.) the projectiles were but little affected by the action of the hard face, but at higher velocities they broke up with even less penetration than at the lower velocities. **Texel trials.**

* Witnessed by the writer, and described in the *Engineer* of July 28th, 1893.

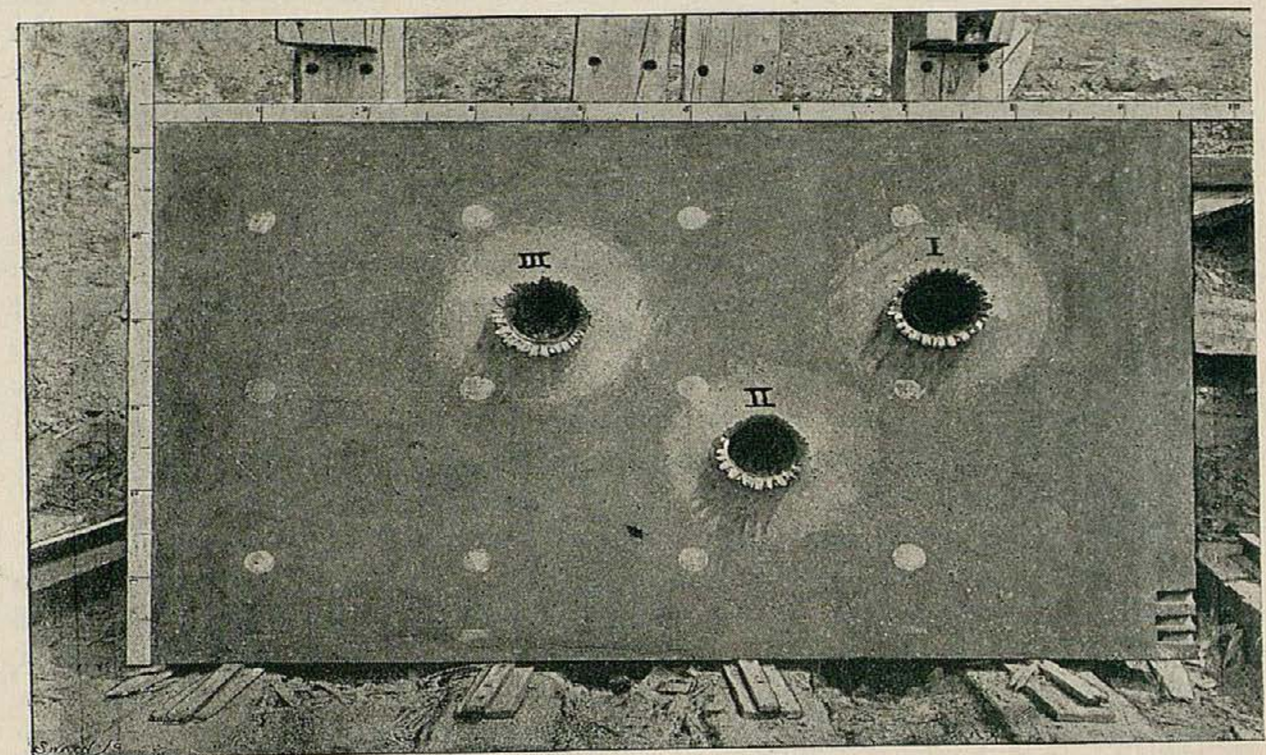


Fig. 2.

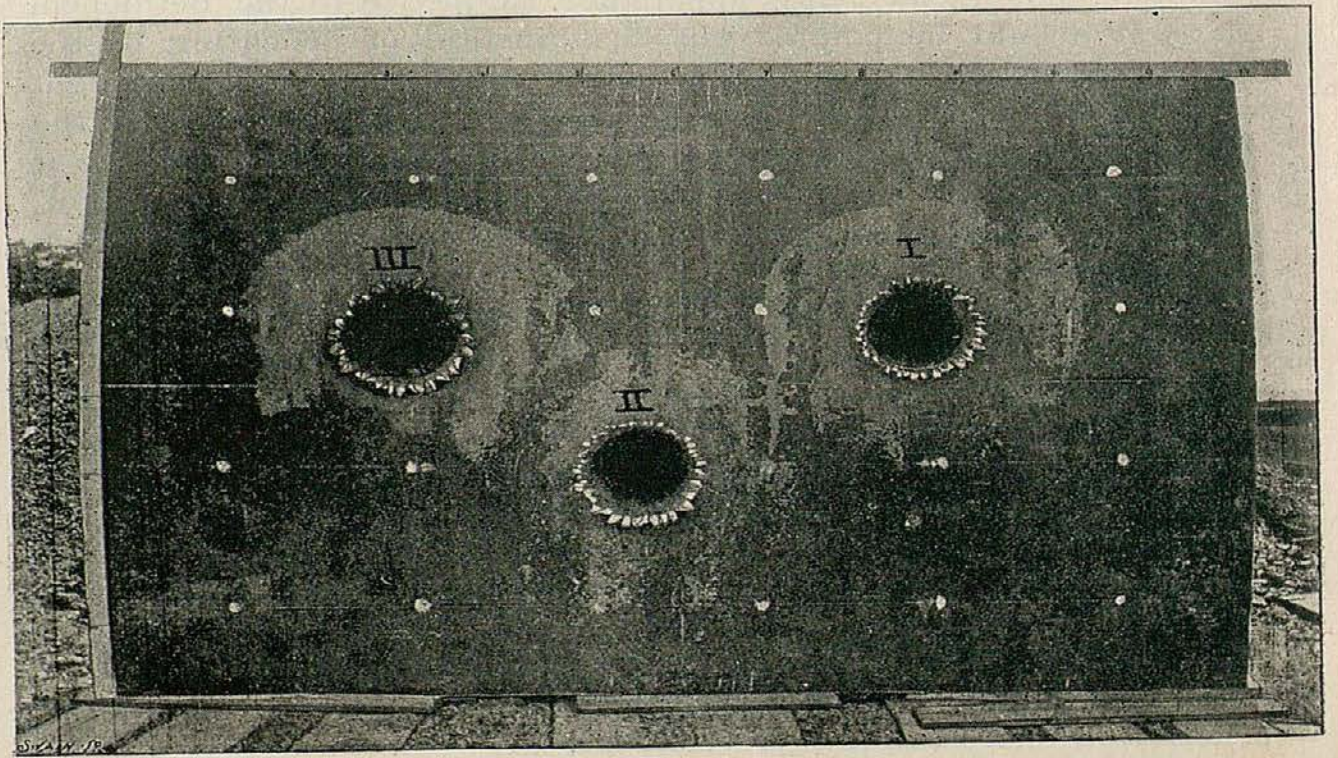


Fig. 3.

The behaviour of shot against a plate with a specially-hardened face and an excellent steel plate not so treated is seen by a comparison of the attack of the Vickers and St. Chamond plates. At 440 m. (1444 ft.-secs.) the shot penetrated 17·5 cm. (6·9 in.) into the Vickers and 16·25 cm. (6·4 in.), or rather less into the unhardened St. Chamond plate. At 480 m. (1575 ft.-secs.) the respective penetrations were 20·5 cm. (8·1 in.) and 18·75 cm. (7·4 in.). So far it would be supposed that the St. Chamond was the harder plate of the two, so little had been the effect of the hard skin ; but when the velocity rose to 500 m. (1640 ft.-secs.) the case was altered, the point could not bear the shock against the Harveyed face ; in fact the tool broke, so that the penetration in the Vickers came down to 6·2 cm. (2·4 in.), while in the St. Chamond it increased so that the point actually got through the back, and in the two succeeding rounds at 540 m. and 573 m. (1772 and 1881 ft.-secs.) the shot still broke up without entering deeply in Vickers' plate, while it passed clean through the St. Chamond. It must not, however, be supposed that when the projectile breaks up it is immaterial what the velocity is. Previous experiments lead to the belief that an increase of velocity adds to the effect of a breaking shot, perhaps before the line of least resistance is discovered. It is difficult to argue from the behaviour of a plate that had already received so much punishment; but the last round developed cracks in Vickers' plate, and, at all events, does not appear to contradict the supposition based on the Portsmouth trials.

It appears on the present occasion that the Dutch authorities preferred the St. Chamond plate, either because they objected to the slight contortion manifested by the hardened plates in manufacture or to the measure of fracture effected, or because the plates did not all behave equally well. Probably, however, most naval officers would prefer the Vickers plate. The backing photograph shows that even when two more rounds had been added to the five trial ones, everything was kept out, whereas the St. Chamond plate allowed one projectile to pass clean through the backing, so that even the maker of that plate would have preferred Vickers' to his own if he had been called upon to stand behind it when under fire. For cruisers' armour, hard-faced plates are exactly what is to be desired.

The following are the details of the trial:—The firing was carried out on August 23rd and 24th under Rear-Admiral G. Kruijs The plates were 2 m. by 1·5 m. by 15 cm. (6 ft. 7 in. by 4 ft. 11 in. by 5·9 in.), and probably weighed about 3·5 tons. They were to be attacked by a 12-cm. (4·72-in.) gun, 35 calibres long, firing steel projectiles, each weighing 26 kilos. (57·3 lb.), with charges varying

from 6·7 kilos. (14·8 lb.) to 10·6 kilos. (23·4 lb.). The following makers submitted plates for trial:—Vickers, Cammell, St. Chamond, Krupp, Schneider, and Brown. Of these Vickers, Cammell, and

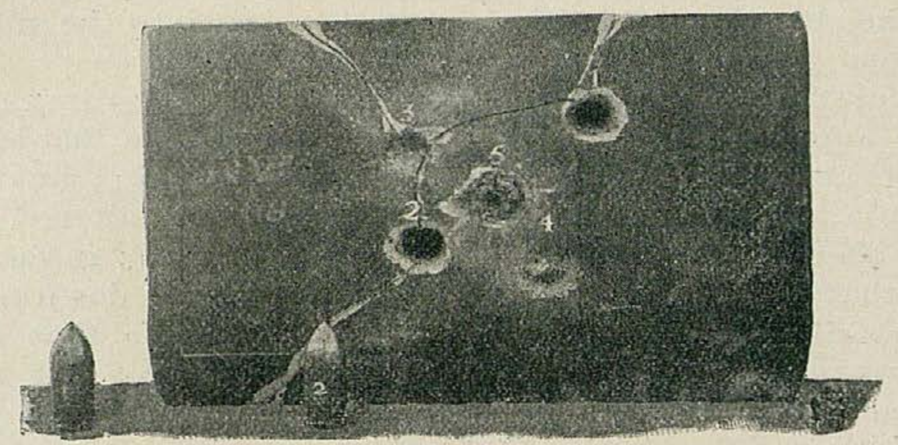


Fig. 4.

Brown's plates were Harveyed, Krupp and Schneider's plates had hardened faces, and St. Chamond's only was not subjected to any special process. The general results are briefly shown in the table on page 376.

At the makers' request it was decided to fire two more rounds at the Vickers plate at the low velocities. The sixth shot, although broken, was not smashed into fragments like those striking at the higher velocities. The point was detached and the cylindrical portion was broken in two pieces longitudinally (see Fig. 16), so that

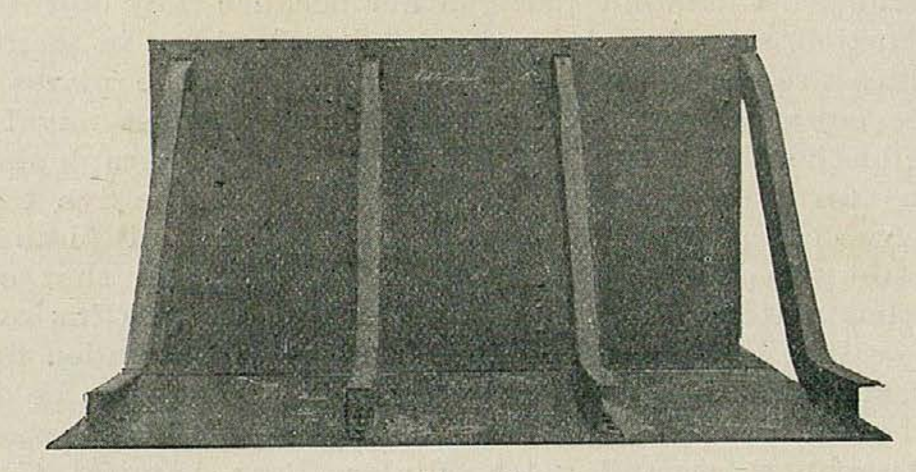


Fig. 5.

the statement above made as to the destructive action of the hardened face being limited to impact at the higher velocities, is not contradicted by this round.

Fig. 4 shows the Vickers plate face after five rounds; it may be seen to be broken into three pieces, and Fig. 16 shows the same after its two additional rounds. At a glance are seen the deep holes made by the projectiles striking at low velocities, viz., rounds 1 and 2 in Fig. 4, and 1, 2, 6, and 7 in Fig. 16, and also the broken-up heads wedged and disintegrated in the rounds 4 and 5 fired at high velocities. Fig. 5 shows the skin at the back of the shield after the

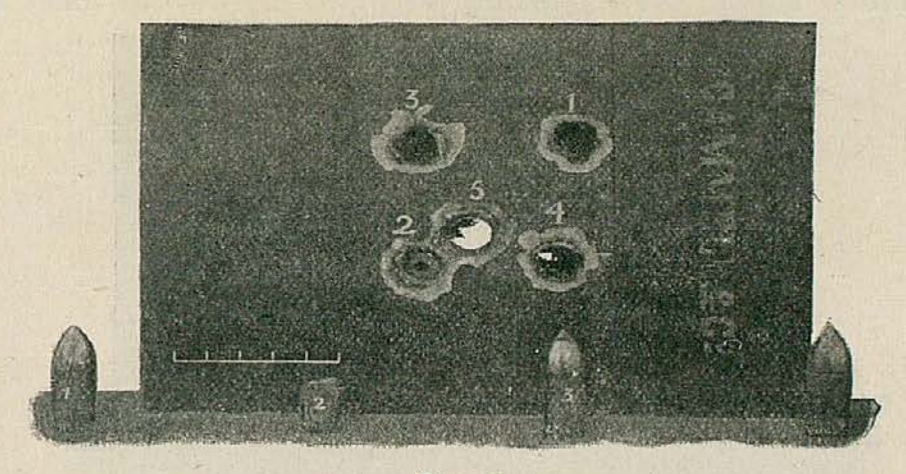


FIG. 6.

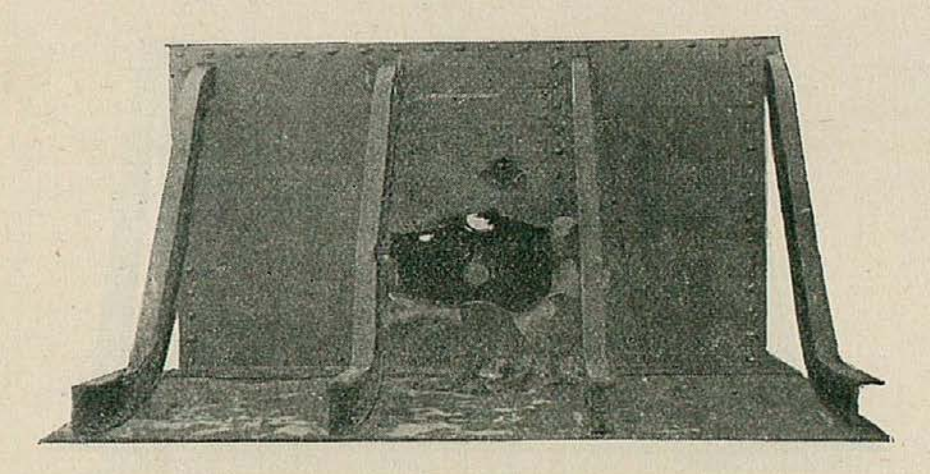


FIG. 7.

attack, which, it may be seen, is uninjured, so that a vessel covered by this plate would have been completely protected. The muster of the four projectiles fired at low velocities at the base of the plate, and the three disintegrated heads of those fired at high velocities, speaks very clearly as to the action of the hardened face.

Figs. 6 and 7 Cammell's plate is obviously not nearly so hard as Vickers'. It has allowed the high velocity projectiles to pass

through instead of breaking them up. On the other hand, it has not even cracked, but a ship would have suffered from the entrance of the projectiles intact. Round 5 was not even recovered.

Figs. 8 and 9 show the St. Chamond, the only plate that had not been subjected to a face-hardening process. The characteristic fringes of the steel round the holes would suggest this. It is a very fine plate, No. 5 only has passed through the skin (see Fig. 9); neverthe-

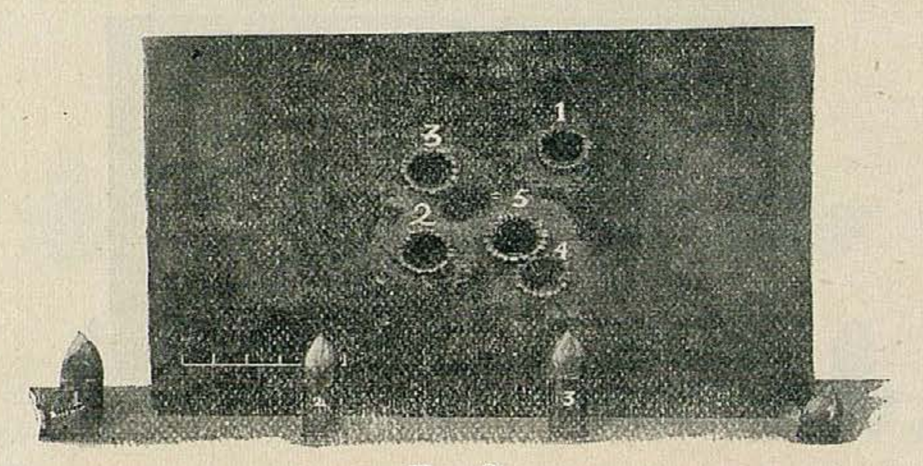


FIG 8.

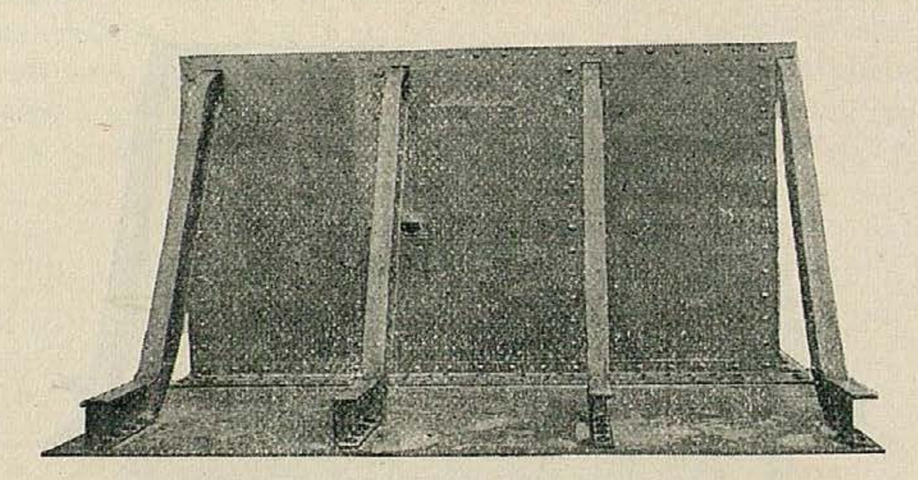


FIG. 9.

less we should prefer the Vickers for service, because it kept the whole of the projectiles out, and although broken asunder had still considerable resistance left in it. Figs. 10 and 11 show Krupp's plate and back of shield. The three projectiles with the highest velocities have passed clean through the skin, and would have entered the ship; No. 5 was not recovered, having passed on to a distance estimated at 2000 m. This may be intended to be a face-hardened

plate, but it can hardly be called so. Two projectiles have their heads broken off, but not the two striking at the highest velocities. Figs. 12 and 13 are of Schneider's plate. There is some irregularity here. Round 2 broke up at 1575 ft. secs. striking velocity, and while 3 and 4 went clean through, No. 5 broke up. Perhaps the portion of the face where 2 and 5 struck was harder than the rest, seeing that these two struck near the same spot and both broke up. Figs. 14 and 15 are of Brown's plate. Here again is irregularity.

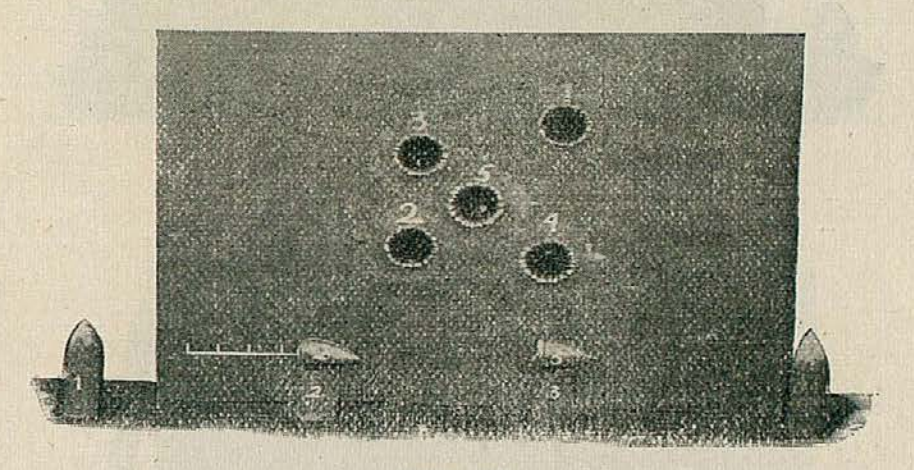


FIG. 10.

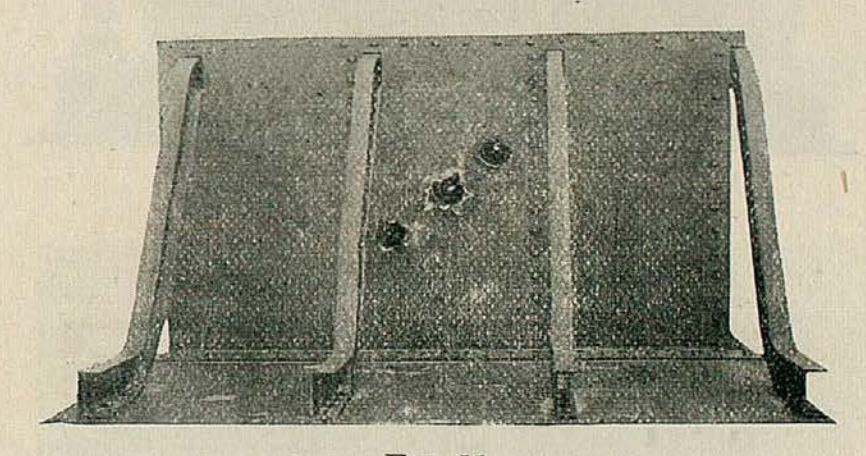


FIG. 11.

Shots 3 and 5 got through, though only the latter passed through the skin; 2 and 4 broke up, the former with the white splash characteristic of disintegration. Altogether the plates are good, but Vickers' alone would have afforded complete protection to a ship. This it did at the cost of breaking across, dividing into three. Without question the other plates would have borne two or more additional rounds with less effect than was produced on Vickers'

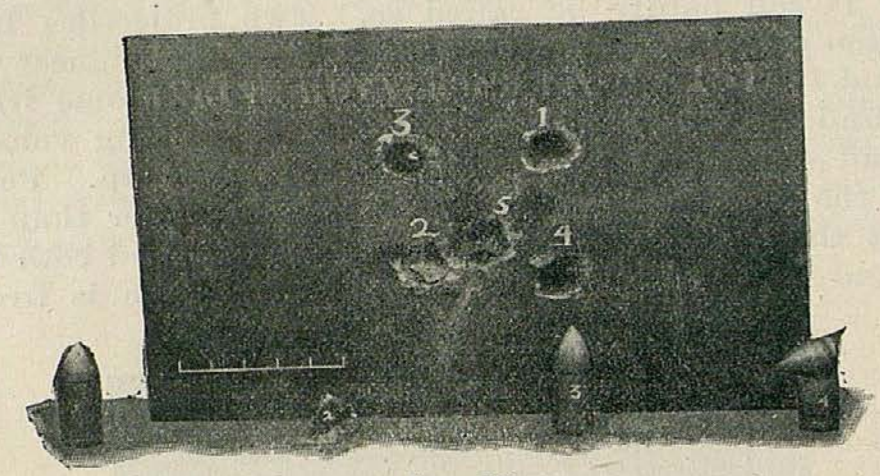


Fig. 12.

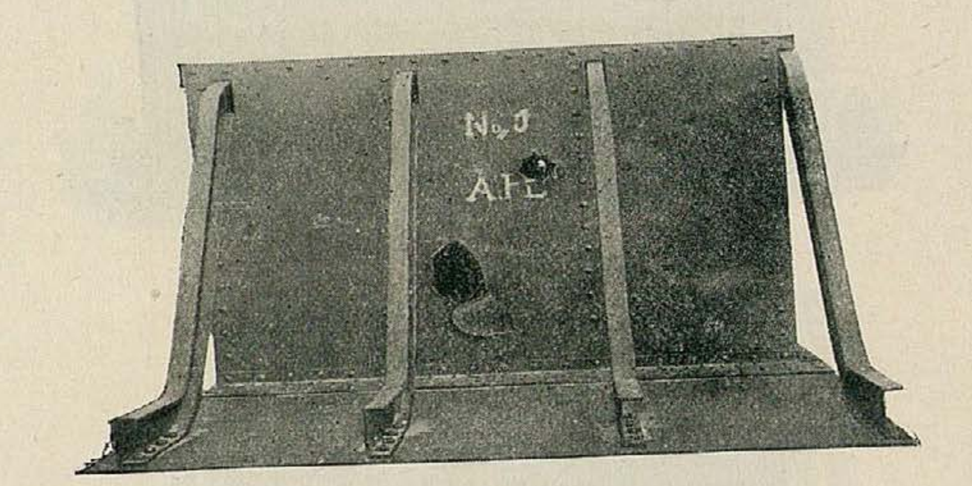


Fig. 13.

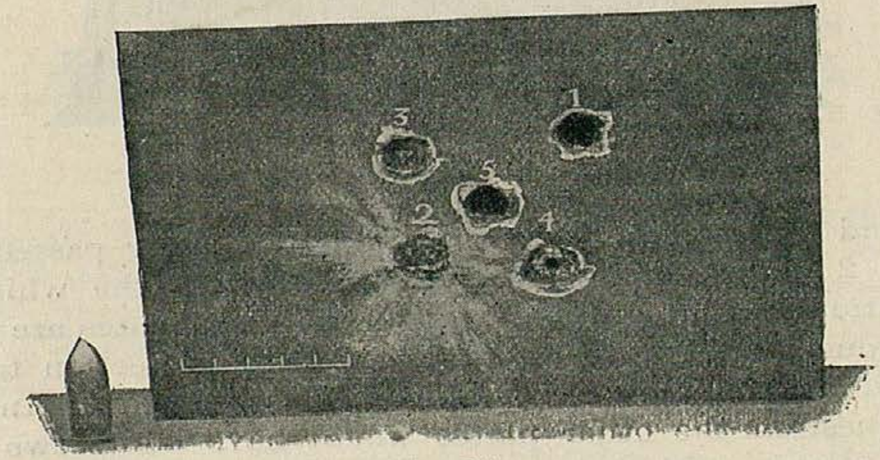


Fig. 14.

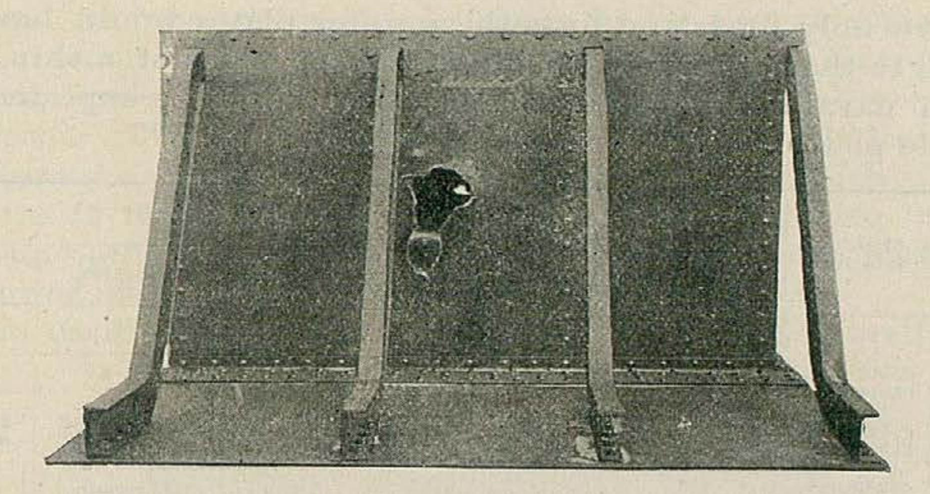


Fig. 15.

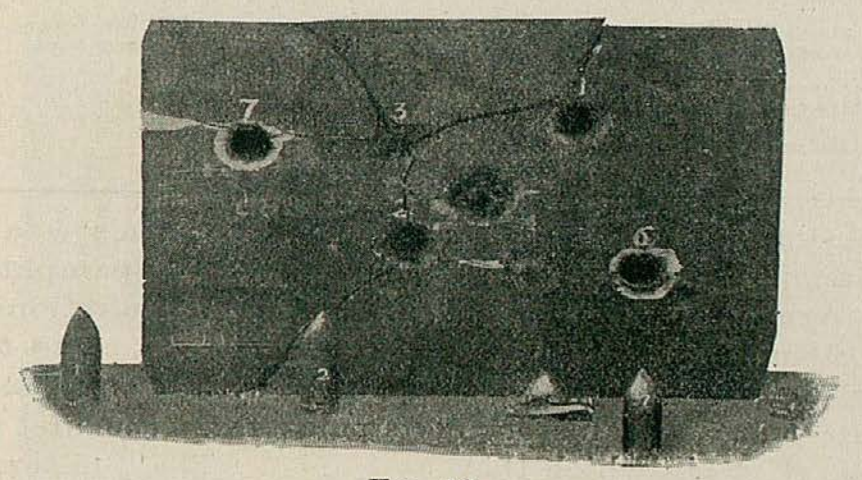


Fig. 16.

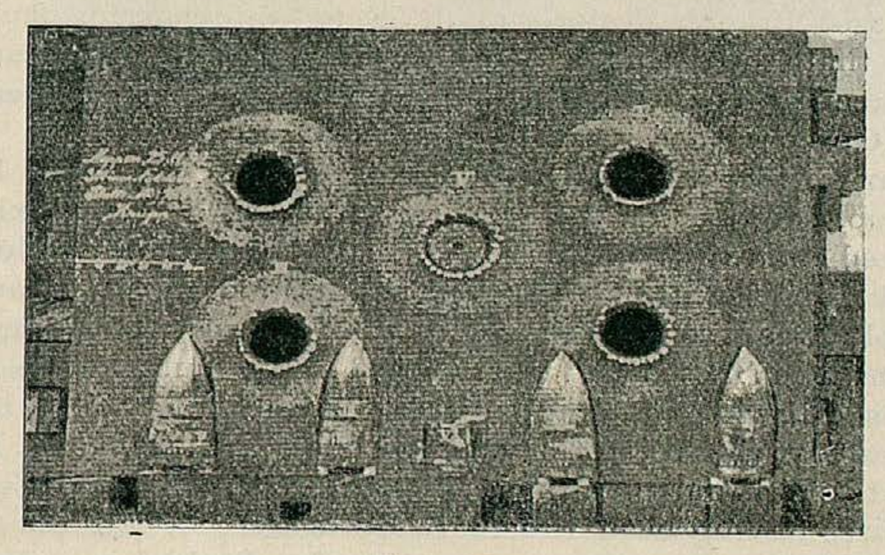


Fig. 17.

plate. Probably for island forts these softer plates would have been preferable to that of Vickers, but not for the sides of a ship, seeing that in no naval action could seven or five blows be expected to fall on a single plate.

	Striking velocity.	Makers.					
		Vickers.	Cammell.	St. Chamond.	Krupp.	Schneider.	Brown.
		Penetration inches and remarks.					
1st Round.	440 m.s. 1444 f.s.	6·9	6·9	6·4	6·9	7·2	6·9
2nd ,, .	480 m.s. 1575 f.s.	8·1	11·6	7·4	8·0	Head broke off in plate.	Head broke off in plate.
3rd ,, .	500 m.s. 1640 f.s.	2.11 Shot broken.	Through.	Nearly through.	Through.	Through.	Through.
4th ,, .	540 m.s. 1772 f.s.	Shot broken up.	Through.	Through.	Through.	Through.	6 3 Shot broken up.
5th ,, .	573 m.s. 1881 f.s.	Shot broken up.	Through.	Through.	Through.	Head broke off in plate.	Through.
6th ,, .	440 m.s. 1444 f.s.	6·5 Shot broken.	..	..	..	..	..
7th ,, .	440 m.s. 1444 f.s.	7·1	..	..	..	..	..

German armour constructions and French imitations.

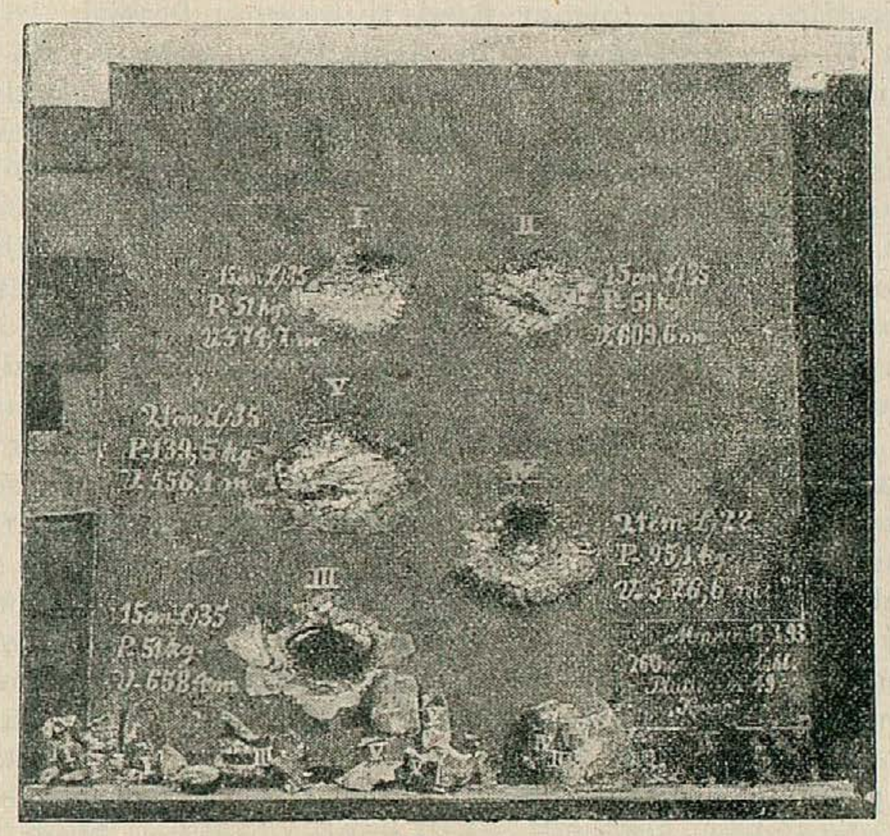
The well-known writer and member of Gruson's establishment, Von Schütz, published in the spring of 1893 a pamphlet entitled "German Armour Constructions and French Imitations," dealing with the claim put forward by French constructors to the cupolas and other designs generally associated with Schumann's name. Von Schütz traces the history of cupolas from the first proposal of Coles to the shape in which they now exist. The question, however, principally concerns land constructions. Drawings are given of German and French designs of different dates, giving such definite evidence that the latter are copied from the former, that the only way to meet it would be to produce French designs of earlier date than the German ones given in the pamphlet.

Armour exhibited in the Chicago Exhibition.

Armour plates were well represented at the Columbian Exhibition at Chicago, samples of American manufacture being exhibited by the United States Government and by Bethlehem, while Germany was well represented by Krupp, and England by Brown. How remarkable was the collection of plates brought together may be seen from the fact that it included three out of the four best specimens whose photographs were printed in the "Annual" for 1893—namely, the nickel plate illustrated on p. 306, the Bethlehem Harveyed plate on p. 309, and the Brown-Tresidder on p. 311. These plates having been thus already described, call for no further notice in detail. Speaking generally, the Bethlehem plate may be

mentioned as having remained intact under probably the heaviest attack to which a plate has been yet subjected. A Krupp plate, to be noticed hereafter, appears to be the nearest approach to a rival in this respect. The Brown-Tresidder plate, while much less severely tried, possessed the peculiar merit that projectiles, which were a full match for it theoretically, had broken on its face with less injury than in any other plate, for in one or two cases a slight dent, without lodgment of metal, was the only evidence of the blow.

Krupp exhibited compound or steel-faced plates, as well as plates



Front.

Fig. 18.

of nickel steel, one of which had a hardened face. The compound plates were good, and showed complete union between the iron and steel. The nickel steel were of very good quality. Fig. 17 (p. 375) shows the one which was most severely tested. The plate measured 10 ft. 9·6 in. by 8 ft. 4·8 in. by 11·81 in., weighing 20·01 tons, which had been attacked, on November 25th, 1892, by four steel and one chilled iron shot, fired from a 28-cm. (11·02-in.) gun. The blows were, theoretically, nearly equal, the heaviest being with a steel projectile weighing 512·34 lb., and a velocity of 1554 ft.-secs., and a

calculated perforation of 12·9 in. of steel, or considerably more than a match for the plate. This plate is excellent, both as to perforation and resistance to cracking. The steel projectiles, after recovery, are shown at the base of the shield. They are apparently uninjured. The chilled shot is shown broken in the plate.

Fig. 18 shows the nickel steel plate with hardened face. No information was given as to the process of hardening, except that it was not the Harvey process. The plate measured 8 ft. by 6 ft. by 10·23 in., weighing 9·06 tons. This was attacked on March 13th, 1893 by both a 15-cm. (5·9-in.) gun and a 21-cm. (8·26-in.) gun with steel projectiles. The former fired three rounds with 1886, 2000, and 2160 ft.-secs. velocity. The last, with a projectile weighing 112·43 lb., had a calculated perforation through steel, on the English system of 11·75 in., and on that of Krupp of 17·46 in. of iron, or on the English deduction for steel, 13·97 in. The 8·26-in. gun fired two rounds, one with a steel projectile weighing 209·65 lb. and 1727·7 ft.-secs. velocity, the last weighing 307·54 lb., with a striking velocity of 1824·5 ft.-secs., having an energy of 7096 ft.-tons, or 788 ft.-tons per ton of plate, and a calculated perforation, on the English system, of 17·3 in. of iron, or on the Krupp formula known in this country of 19·0, while in Krupp's book it is calculated as 20·87 in. The projectile broke in the plate. The plate is shown in Figs. 7 and 8. The lighter blow with the 8·26-in. gun has made a decided tear at the back, but the heaviest blow of all has only made a slight bulge.

This plate deserves special attention; it challenged comparison with any that has ever been tested. The one that most nearly corresponded to it was the Bethlehem plate above mentioned in the Exhibition, which had been subjected to five blows from an 8-in. gun without suffering much. The two plates are of identical area. Krupp's plate is only 10·23 in. thick, the Bethlehem is 10·5 in. Krupp's plate has defeated one much heavier blow than the Bethlehem plate was subjected to, the striking energy of the American 8-in. gun being 5008 ft.-tons, and the perforation 14·6 in. of iron on the English system. For a maximum blow, the then, Krupp was the more severely tested, but the Bethlehem bore five blows with 8-in. projectiles, and it is the repeated attack of heavy blows that seems to tell most severely.

Cammell and Brown plates at Shoeburyness.

During the latter half of 1893, very fine steel Harveyed plates have been tested at Shoeburyness. On August 31st a Cammell Harveyed plate 8 ft. by 6 ft. by 10½ in., weighing probably a little over 9 tons, after the usual attack of five 6-in. projectiles, stopped two 9·2-in. projectiles, each weighing 380 lbs. The striking velocity

of the last round was 1948 ft.-secs., and the energy 10,000 ft.-tons. The plate was broken, and the point of the last shot got 18 inches past the back of the plate, but that the plate exhibited a great increase in resistance is evident from the fact that the energy per ton for the last blow is 1111 ft.-tons, and the calculated perforation on the English system 19·5 of iron or 15·6 of steel, and on Krupp's system 21·4 of iron.

A steel Harveyed plate of Brown's, of the same dimensions, allowed one 9·2 Holtzer projectile to pass through it, but it resisted a heavier blow than any above recorded, namely, a 9·2-in. projectile striking with 2035 ft.-secs. velocity and 10,910 ft.-tons energy, implying a calculated perforation of 20·4 in. iron or 16·3 in. steel on the English system, or 22·9 in. of iron on Krupp's system, and 1212 ft.-tons energy per ton of plate.

Russian trial of Schneider nickel steel armour.

In the end of the summer of 1893 a Schneider nickel steel plate 8 ft. by 8 ft. by 15·9 in. was tried for the Russian new battleship Tria Sviatitelia (Three Saints). It probably weighed 18¼ tons. It received four blows from 9·4-in. Holtzer steel projectiles, each weighing 317 lbs., with striking velocities of from 1948 to 2001 ft.-secs. The greatest penetration was 14·1 in. All the projectiles broke on impact, and two of them also set up to some extent; the work of fracture was limited to a few fine cracks. The plate therefore behaved admirably. It appears to have been slightly harder than the American nickel steel plates tested this year. The maximum calculated perforation is 18·1 in. of iron, or 14·5 in. of steel.

Pola competition.

At Pola a competitive plate trial took place last Autumn. The plates competing were four nickel steel plates supplied by Dillingen, Vickers, Cammell, and Witkowitz, as well as a Harveyed plate sent by Vickers, and a plate with a hardened face sent by Krupp, termed in the report a Harveyed plate, but this is probably a slip, as Krupp specially explains that it is not the Harvey process which he employs. The plates were 5·9 ft. by 7·87 ft. by 10·6 in. They were attacked by four rounds towards the corners from a 15-cm. (5·9-in.) gun, firing a steel projectile weighing 112·4 lb., with a striking velocity of about 1980 ft., except one round fired at the Dillingen plate with 2070 ft. velocity. A fifth round was fired at the centre with a steel shot from a 24-cm. (9·4-in.) gun., the steel projectile weighing 474 lb., with a striking velocity of 1417 ft.-secs. The 15-cm. projectiles were just a match for the plates, theoretically; the calculated perforation on the English system being 13·4 in. of iron, or 10·8 in. of steel. The larger shot was an over match, having, theoretically, a perforation of 15·4 of iron, or 12·3 of steel. The general result was that the Vickers Harveyed plate and the

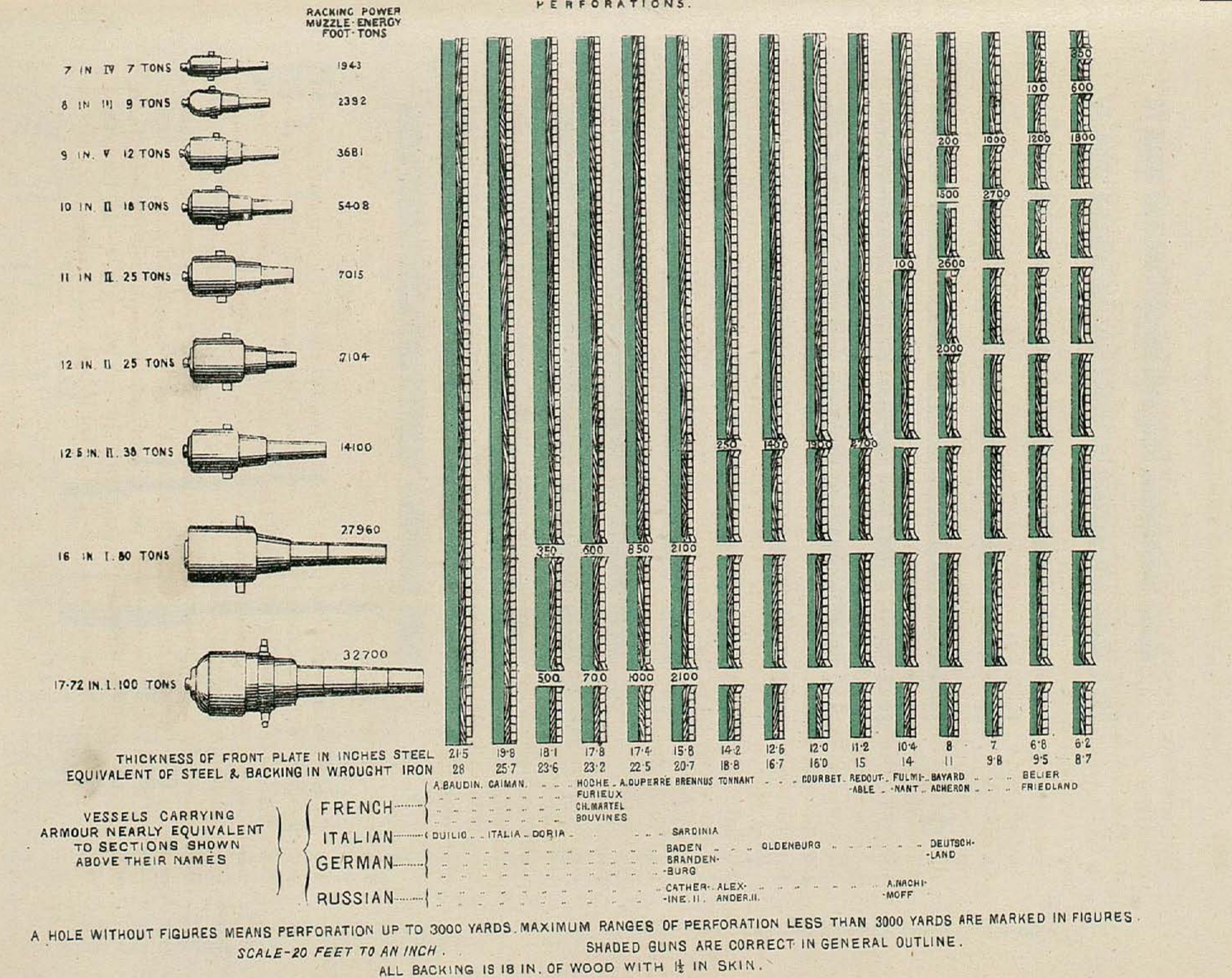
Witkowitz plate only, were considered to have fulfilled the required condition of keeping out the smaller shot. The former was fractured by the larger shot, and the latter was not, nor did it let it perforate ; so that while it may be wondered how this plate should beat those of the best makers known, it can be no wonder that the Austrians preferred their own plate. The Krupp plate had some flaw which caused it to break up in such a way as not to be a fair representative. It may be observed that the successful plate again was an untreated one. The Austrian authorities, like the Dutch, appear to dread the difficulties in manufacture due to the Harvey and other systems of hardening the plate face. In fact, America and England have gone much farther than Continental powers in the adoption of hard-faced armour. England has actually ordered Harveyed plates for the Renown from Cammell and Brown. As noticed above, all difficulties have not been overcome, but in the face of the results obtained few in this country would be content with untreated plates.

Paper read by C. E. Ellis at Institution of Naval Architects.

On March 15th last, Mr. C. E. Ellis, associate managing director of Messrs. John Brown and Co., Sheffield, read before the Institution of Naval Architects an admirable Paper on "Recent Experiments on Armour." The writer pointed out the great improvements which had been effected during the last few years everywhere, especially in England. He estimated that the resisting power of plates as at present made with faces hardened by treatment is at least 50 per cent. greater than that of the predecessors of 1888. A table of results obtained experimentally with nearly all the treated plates fired at, either at home or abroad, was given, which is specially valuable for reference. In the discussion that followed Mr. White, the Director of Construction, pointed out the leading position taken at the present moment by England in the matter of armour.

Alterations in the Plates Showing Perforation of Armour.

Fundamental alterations have been made in both armour and in the system of recording the power of the guns for the following reasons. The number of steel-clad ships have increased each year, while at the same time the power of shot to perforate steel, except such as has a specially-hardened face, has also increased. The time has come, then, to deal with ordinary steel as perforated systematically in a way which may be tabulated and compared with wrought-iron. This has been done on the system employed in England, of considering 4 in. of steel equal to 5 in. of wrought iron. Further, to bring the whole shield, backing included, to an equivalent in



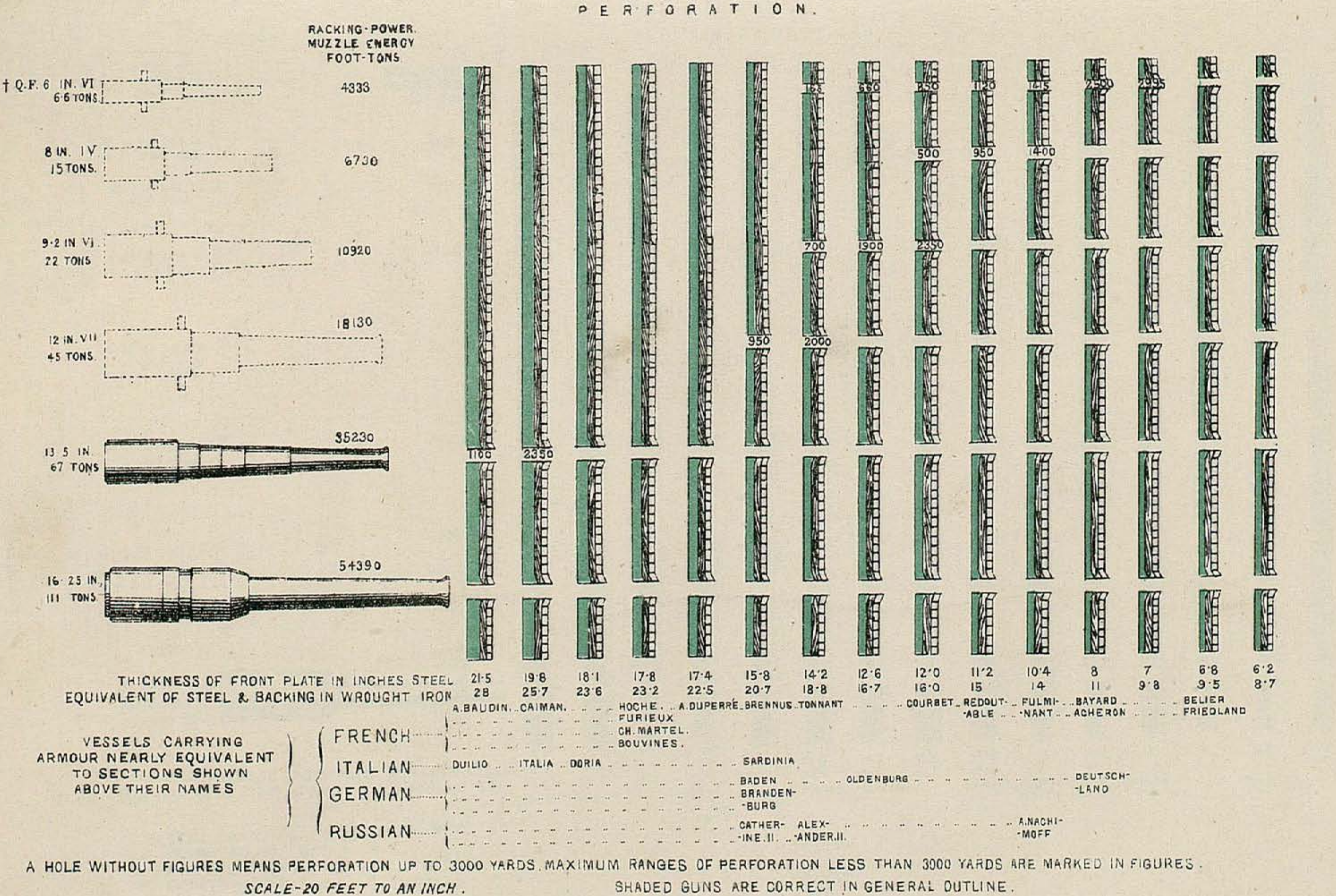
A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS. MAXIMUM RANGES OF PERFORATION LESS THAN 3000 YARDS ARE MARKED IN FIGURES.

SCALE–20 FEET TO AN INCH. SHADED GUNS ARE CORRECT IN GENERAL OUTLINE.

ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN SKIN.

NOTE THE 29 TON 10 IN. GUN PERFORATES THE 18·8 IN IRON (TONNANT) SHIELD AT 1800 YDS. & ALL THINNER SHIELDS AT ALL RANGES.

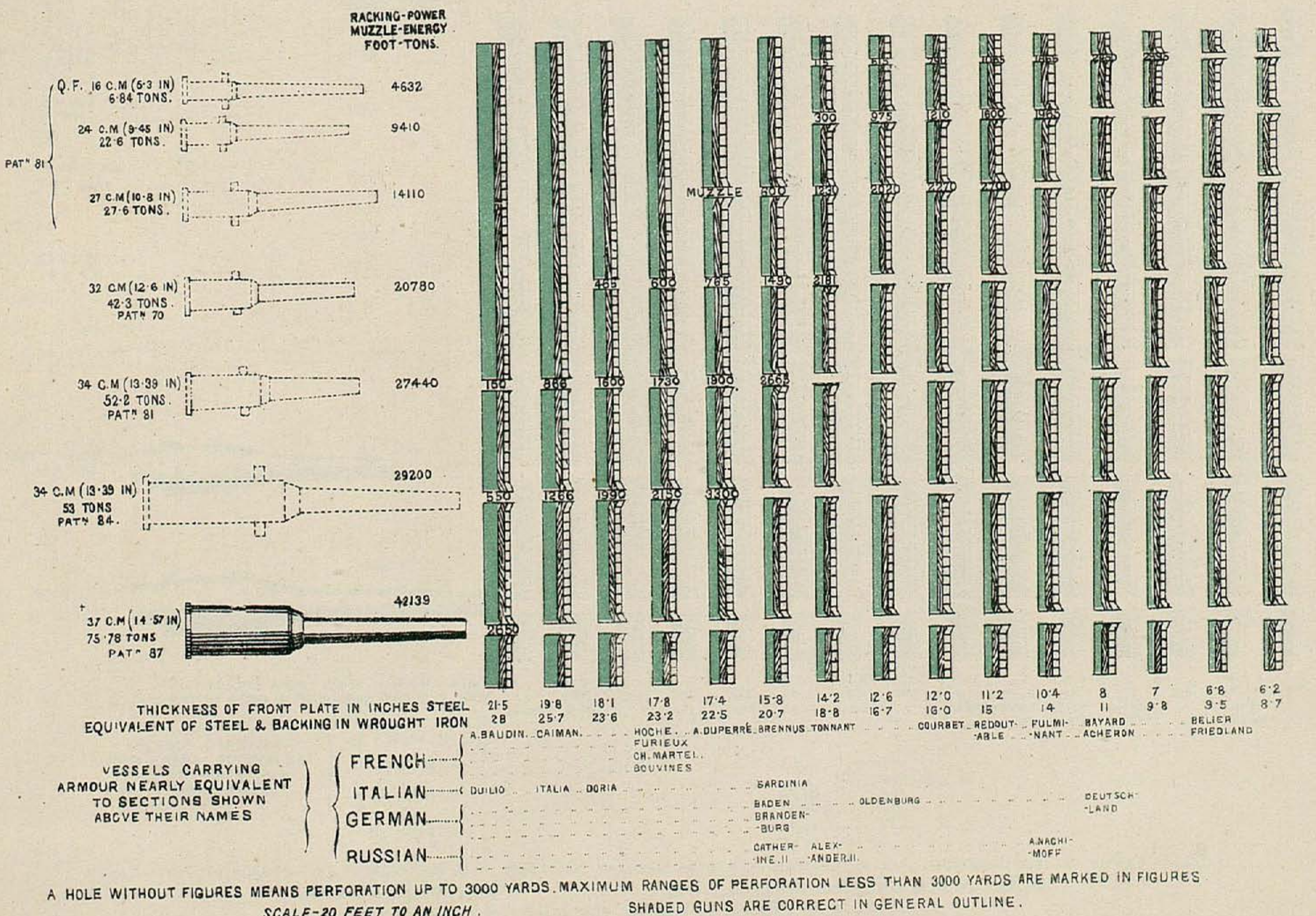
† THIS GUN IS TAKEN FROM ELSWICK Q.F. GUN TABLE.



BRITISH B.L. GUNS.
PERFORATION.
RACKING-POWER.
MUZZLE ENERGY
FOOT-TONS.
† Q.F. 6 IN. VI 6·6 TONS
4333
8 IN. IV 15 TONS.
6730
9·2 IN. VI 22 TONS
10920
12 IN. VII 45 TONS
18130
13 5 IN. 67 TONS
35230
16·25 IN. 111 TONS
54390
660
850
1120
1415
2500
2935
500
950
1400
700
1900
2350
950
2000
1100
2350
THICKNESS OF FRONT PLATE IN INCHES STEEL
EQUIVALENT OF STEEL & BACKING IN WROUGHT IRON
21·5 28
19·8 25·7
18·1 23·6
17·8 23·2
17·4 22·5
15·8 20·7
14·2 18·8
12·6 16·7
12·0 16·0
11·2 15
10·4 14
8 11
7 9·8
6·8 9·5
6·2 8·7
A.BAUDIN. CAIMAN. HOCHE. A.DUPERRÉ. BRENNUS. TONNANT COURBET. REDOUT-ABLE. FULMI-NANT. BAYARD. ACHERON. BELIER FRIEDLAND
FURIEUX
CH.MARTEL.
BOUVINES.
VESSELS CARRYING
ARMOUR NEARLY EQUIVALENT
TO SECTIONS SHOWN
ABOVE THEIR NAMES
FRENCH
ITALIAN
DUILIO ITALIA DORIA SARDINIA
GERMAN
BADEN BRANDEN-BURG OLDENBURG DEUTSCH-LAND
RUSSIAN
CATHER-INE.II. ALEX-ANDER.II. A.NACHI-MOFF
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† THIS GUN IS TAKEN FROM ELSWICK Q.F. GUN TABLE.

FRENCH GUNS.

PERFORATIONS.



PERFORATION

Gun	RACKING-POWER MUZZLE-ENERGY FOOT-TONS.	Maximum ranges of perforation marked on plate (yards)
† Q.F. 15 C.M (5·9 IN) 135 TONS	3163	250, 550, 1700, 2210, 2353, 2735
† Q.F. 16 C.M (6·3 IN) 5·41 TONS	3895	75, 300, 610, 955, 2138, 2590, 2835
24 C.M. (9·45 IN) 18·7 TONS	9024	1135, 1465, 2000, 2550
26 C.M. (10·3 IN) 21·7 TONS	7211	235, 1317, 2380, 2590
30·5 C.M (12 IN) 35·4 TONS	14780	NEARLY AT MUZZLE, 710, 1635, 1950, 2430, 2965
‡ 30·5 C.M (12·01 IN) 61·5 TONS	34700	
40 C.M (15·75 IN) 119 TONS	52500	

THICKNESS OF FRONT PLATE IN INCHES STEEL	EQUIVALENT OF STEEL & BACKING IN WROUGHT IRON	FRENCH	ITALIAN	GERMAN	RUSSIAN
21·5	28	A. BAUDIN.	DUILIO		
19·8	25·7	CAIMAN.	ITALIA		
18·1	23·6		DORIA		
17·8	23·2	HOCHE. FURIEUX CH. MARTEL. BOUVINES.			
17·4	22·5	A. DUPERRÉ.			
15·8	20·7	BRENNUS	SARDINIA	BADEN BRANDEN-BURG	CATHER-INE II.
14·2	18·8	TONNANT			ALEX-ANDER II.
12·6	16·7			OLDENBURG	
12·0	16·0	COURBET.			
11·2	15	REDOUT-ABLE			
10·4	14	FULMI-NANT			A. NACHI-MOFF
8	11	BAYARD ACHERON		DEUTSCH-LAND	
7	9·8				
6·8	9·5	BELIER FRIEDLAND			
6·2	8·7				

VESSELS CARRYING ARMOUR NEARLY EQUIVALENT TO SECTIONS SHOWN ABOVE THEIR NAMES

A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS. MAXIMUM RANGES OF PERFORATION LESS THAN 3000 YARDS ARE MARKED IN FIGURES.

SCALE—20 FEET TO AN INCH.

SHADED GUNS ARE CORRECT IN GENERAL OUTLINE.

ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN SKIN.

† TAKEN FROM KRUPP Q.F. GUN TABLE.

‡ TAKEN FROM KRUPP ORDNANCE AT CHICAGO.

wrought-iron, an inch is added to the iron equivalent of the plain unbacked steel plate. The backing and skin, though greatly in excess of an inch taken *separately*, may be roughly represented by supposing the actual solid front plate to be increased by an inch in thickness. Beneath each section there is noted the thickness of the front plate of steel, and just below that the equivalent in wrought-iron for the whole armour and backing. Thus, for example, the Amiral Baudin class has 21·5 in. of steel, which, with the addition of 25 per cent., becomes 26·9 in., which, with 1 in. added for backing, makes up 27·9 in., or roughly 28 in. as a total equivalent in wrought-iron. On the other hand, the A. Duperré carries 21·5 in. of iron, to which only must be added 1 in. for backing, to bring it to 22·5 in. as a total equivalent.

The lightest guns now shown in the British, French, and German plates are not taken from the service tables, but from the quick-firing gun tables of Elswick, Canet, and Krupp respectively, which would no doubt quickly find their way into ships' armaments in war time.

Lastly, the perforations of the German, French, and British guns have this year been recalculated on the Krupp formula, which is thought to be probably more accurate than the English formulæ for high velocities and giving practically the same results for low velocities.

The General Rules for the attack of armour have been repeated sufficiently often in the "Annuals" of previous years, and are now discontinued.

II.

Ordnance.

Cordite.

During the past year cordite has been approved and has taken its place as a regular service store. Very large quantities have been manufactured both for the Home and Indian services. The charges at present contemplated for ordnance are such as give the same velocity as the powder charges which they supersede; it would be premature to issue a table of these, however.

12-in. wire gun.

A very powerful 12-in. gun, 35 calibres long, wire-wound from muzzle to breech, firing cordite charges has been made and proved, but the details cannot be given at present.

Sir A. Noble on cordite.

Sir Andrew Noble wrote a letter to the *Times* on September 5th last, in which he describes the functions fulfilled by cordite, giving tables showing the comparative effects obtained by cordite, ballistite, prismatic amide powder, and a certain French powder, as well as brown prismatic and E.X.E. powder, the best results being obtained with cordite. Sir A. Noble mentions that, in one instance, with a 42-lb. shot and a pressure of 27 tons to the square inch, the enormous velocity of 4980 ft.-secs. was obtained. He gives proofs of the regularity of burning of the charge, and of the safety with which cordite may be used, while not only is the energy developed for any given pressure nearly double that of powder, but also the erosion or scoring of the bore of the gun is more even and less in extent. With guns below 12 in. in calibre Sir Andrew has had considerable experience; he mentions one 4·7-in. gun which has fired 1219, and another 953 rounds, also a 6-in. gun which has fired 588 rounds with full charges, of which 355 were of cordite.

French high velocity trials.

At Rochefort a 16-cm. (6·3-in.) gun has been brought to the length of 16 mètres (52·5 ft.), 90 calibres long, for experimental firing by the addition of tubes, as in the Elswick gun mentioned in the "Annual" of 1893 (p. 313). With a projectile weighing 45 kg. (99·2 lbs.) the muzzle velocity of 1214 m.s. (3983 ft.-secs.) was achieved by this piece.

List of Authorities.—"Artillery: its Progress and Present Position," Griffin, Portsmouth, for plates and matter. The *Engineer* for plates and matter. Proceedings of United Service Institution. The *Times*. The French Journal, *l'Amorique*. Direct correspondence with manufacturers, Elswick, Krupp, Canet and Whitworth.

An experiment was reported to have been made early in the year at Meppen by Krupp on a special nickel gun steel. Two 3·4-in. shells, each containing 6 oz. of picric acid, were placed, one in a gun of ordinary steel, and the other in one of new nickel steel at 12 in. from the muzzle. Upon the shells being exploded the muzzle of the former gun was blown into fragments, while the bore of the latter only was enlarged locally to the extent of a quarter of an inch. Subsequently a 3·7-in. shell, containing 6·3 oz. of picric acid, was exploded at a point 19·5 in. from the bottom of the bore of the new gun. This enlarged it to the extent of 0·33 in., and caused a fissure 3 in. long. Krupp's nickel gun steel.

Lieut.-General Pestitch delivered a remarkable address at the Academy at St. Petersburg on March 30th, 1892, which was reproduced in the *Revue Maritime et Coloniale* early last year. The main object of the General was to show that ships can very rarely be disabled by artillery fire if their actual vitals, including engines especially, are protected. Consequently he held that far too much weight was devoted to armour, and that vessels with enormous armaments of quick-firing 6-in. guns would be formidable beyond comparison with the present heavily-clad ships. It was stated that, at the present time, the armaments of the ships of various nations represent the following percentages of their total displacement: England, from 8 to 4; France, 9 to 4; Italy, 11 to 4½; and Russia, 10 to 4½ per cent.* The address appears to be in the main almost what has been repeatedly urged by Lord Armstrong. General Pestitch on war-ships.

A very complete review and criticism of the battle-ships of England, with illustrations, was contributed to the *Revue Maritime et Coloniale* of January, 1892, by Prosper Simon, Lieut. de Vaisseau.

A new explosive was tried at Jüterbogk in a series of tests, which commenced on January 31st, 1893. The results are said to be successful. The explosive is said to be a fatty substance of a brownish colour; it was invented by Dr. Weiss of the Gera Dynamite Factory; it explodes neither by blow, shock or spark, but only by the introduction of a fresh substance; its explosion is smokeless, and is accompanied by little detonation. There is said to be but small recoil and little heating of the weapon; it can be used with the ordnance now existing, but new small arm rifles are necessary. New German (Weiss) explosive.

On January 24th, 1894, a new explosive termed "Schnebelite" Schnebele.

* This address has attracted great attention, but there appear to be serious objections to the plan proposed. Such a ship as the Dreadnought or French Tonnerre is impregnable against 6-in. guns. She carries but few heavy pieces, but it is difficult to see what is to prevent her from working havoc and perhaps even closing and sinking any number of such ships as those proposed in succession, in the same way as the first armour-clads treated the wooden ships.

was exhibited and tested at Argenteuil. It had previously been tried at Nunhead South London Rifle Butts. It was shown to possess great power as a propellant, and at the same time to be singularly safe to handle. It is claimed that its products of explosion are free from poisonous gas.

Boys' on the photography of flying bullets.

On April 28th a remarkable paper was read by Mr. C. V. Boys, F.R.S., at the U. S. Institution, on the photography of flying bullets by the light of the electric spark. The action of waves of air formed by the motion of the projectile were exhibited with other features of interest, but, striking as they were, they were not of such practical bearing on naval gunnery as to admit of notice here.

Gun accident on board a German battle-ship.

On August 2nd a 26-c.m. (10·2-in.) Krupp gun burst on board the German battle-ship Baden, from the wedging of the projectile, killing nine and wounding eighteen men. The metal of the gun appeared to be sound and strong.

Lieut. Jaques on European gun-mounting and wire guns.

Lieut. W. H. Jaques, Ordnance Engineer of Bethlehem, reports at the termination of a visit to England last January, in favour of the Canet breech mechanism, and gun mountings of Whitworth, Schneider, and Canet, and states that Schneider makes 60 per cent. of the armour plates ordered by powers who have no home factories. He speaks of the progress made in wire guns in England, and of a report that Krupp has made many wire steel field-guns.

A paper was communicated to the Institution of Naval Architects by Lieut. Jaques on the detachable ram previously advocated by him. This paper was read on March 15th, 1893.

"Artillery: its Progress and Present Position," by E. W. Lloyd and A. E. Handcock.

An important work, under the title "Artillery: its Progress and Present Position," has been brought out by Capt. Lloyd and Mr. Handcock of Elswick. The ability of the writers and the position they occupy enables them to speak authoritatively on all matters concerning Elswick war material, and all artillerists know what a wide field is thus embraced. Chapters I., II. and III. deal with the history of artillery—I. and II. with early times extending to the date of the Crimean War; IV. is devoted to the subsequent or modern period, during which all the important developments have taken place. Chapter IV. deals with gun construction; Chapter V. with heavy naval guns and mountings; Chapter VI. with ammunition arrangements; Chapter VII. with quick-fire guns; Chapter VIII. with coast-defence; Chapter IX. ammunition; Chapter X. electric firing night sights; Chapter XI. field, mountain and siege equipments; Chapters XII. and XIII. internal and external ballistics. The general scope of the work may be seen from the above. It would be impossible to follow such a course through in a review, the work being indeed a treatise on the whole subject of artillery. The

special value lies in the fact that principles are dealt with, instead of presenting the mass of undigested statistics constituting the bulk of some of our official works. In short, the book is readable instead of being useful only for reference as to bare facts and questions of detail.

The more important data and conclusions arrived at are given, and the reasons for the latter stated. The best sectional density for a projectile, that is $\frac{W}{D^3}$, is given as 0·45, and the 88-lb. shot of the 6-in. gun which has this function, 0·40, is instanced as in fault. The length for an efficient naval gun is limited to 40 calibres for a light and 35 calibres for a heavy gun. The life of the 110-ton gun is estimated at from seventy-five to eighty rounds with full charges, after which, if augmenting strips are not fixed on the projectiles, they may probably fail to take the rifling, and so go altogether wild and short. 105 rounds is stated to be the probable limit for the 67-ton gun. A "liner" inserted in the bore of the gun gives it a new lease of life. The Benbow or Sanspareil, with their two 110-ton guns each, would, we imagine, in all probability be obliged to come home for their guns to undergo this relining operation after firing in all 140 rounds, or seventy from each gun at the most; and then, if attacked on the way home by a heavily-clad adversary, would only be capable of firing five or ten rounds from each gun, and these probably badly aimed, for the writers are likely to take a favourable estimate rather than the reverse. The descriptions of the mountings and carriages will be welcomed by those who are used to the singularly unattractive official work on the subject, which, by the way, is on the point of being superseded by a new and, it is to be hoped, greatly improved edition. The Vavasseur hydraulic buffers and other features in the best classes of carriages are described. With regard to ships' carriages providing for high angles of elevation, the interesting fact is mentioned that when our fleet was ordered to proceed up the Dardanelles, a shore gun existed mounted so high that no piece in the fleet could have attacked it. The question of hand working is dealt with, and the fact noticed that the 10-in. guns of the Thunderer are examples of the heaviest kind extant, though a design providing alternative hand gear for a 50-ton 12-in. gun is described, which is noticed hereafter. The supply of ammunition and guns on board ship, especially the question of separation of shell and powder in the heavier quick-fire guns, is a very interesting subject, and is discussed in this work. With regard to complication in issue of ammunition, the dreadful possibility is suggested of a mistake in the issue of 6-in. ordinary

and 6-in. quick-fire ammunition to ships existing which have important batteries of the two alternative guns—such as the Benbow the 6-in. ordinary, and the Royal Sovereign the 6-in. quick-fire gun. The 6-in. ammunition of the Benbow would be useless to the Royal Sovereign, and *vice versâ*. The advantages of quick-fire ammunition as to obturation are dealt with. The illustrations of designs deserve special notice :—

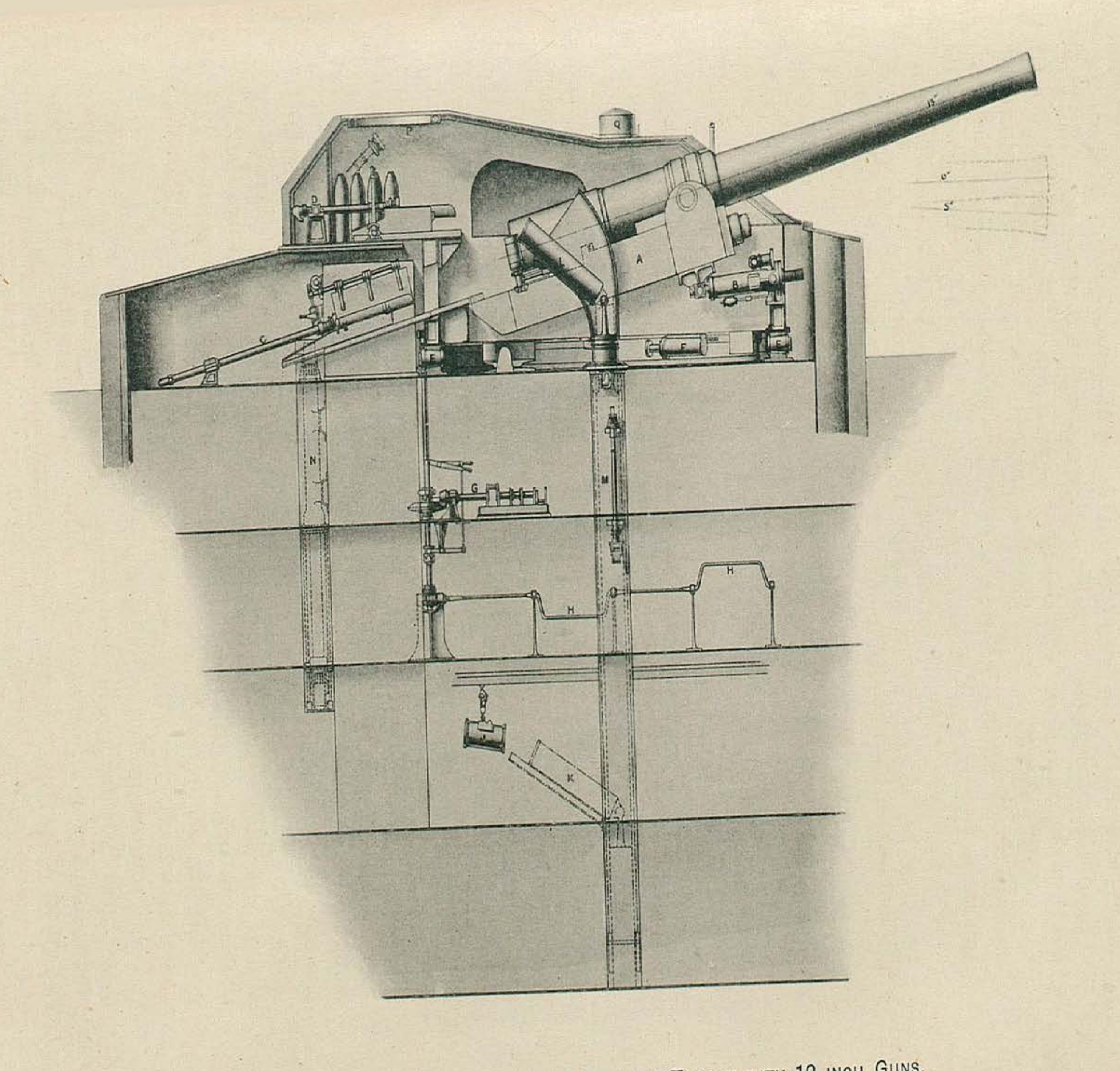
New Elswick hydraulic mounting.

A design has been got out at Elswick for a mounting for a 12-in. gun in a turret (*see* Plate) on the following principles. (1.) Every operation can be done by hand or steam power. (2.) A fixed loading station for both guns to be loaded with maximum rapidity is provided, while a system for central loading also exists by which means one gun can be loaded in any position of the turret, while the other is kept pointed on the enemy. (3.) The gun carriage and slide are so balanced about the pivots or trunnions that in elevating it is only necessary to overcome friction.

To fulfil these conditions the gun must be loaded in the firing position, and it must automatically return to that position immediately after recoil. Helical springs perform this duty just as they do with quick-firing guns. The springs are placed in the rear part of the slide between the slide frames; they weigh for the 50-ton gun mounting about 3½ tons, and help to balance the muzzle of the gun. There are two sets of springs, each set being divided into short lengths; thus a damaged length could be replaced with very little delay or trouble. A hydraulic jack is also supplied to run out the guns in case of a breakdown, but the springs have been proved to be thoroughly reliable if not overstrained.

The running out being thus provided for, the recoil press has no duty beyond absorbing recoil, and it therefore differs only from the simple recoil press of a quick-firing gun in size. The elevating press being called upon to do so little work, can be greatly reduced, and if placed horizontally and made to act on a vertical arm below the mounting, much space can be saved, and consequently, possibly the armoured chamber beneath the turret might be reduced, and a saving effected in weight of armour.

It is proposed to fit the guns with the Elswick coned breech screw. Hand gear performs the unscrewing and swinging round of the breech-stopper in one continuous motion, but arrangements are fitted for doing this automatically by the running out of the gun, and also for closing the breech rapidly by means of a lever and spring. It is convenient for the breech screws of both guns to open outwards, that is, from the centre of the turret, to effect this and yet have the guns interchangeable, the design provides for the guns



Elswick New Design for Hydraulic Turret with 12 inch Guns.

Reproduced, by permission, from "Artillery: Its Progress and Present Position."—(Lloyd & Hadcock.)

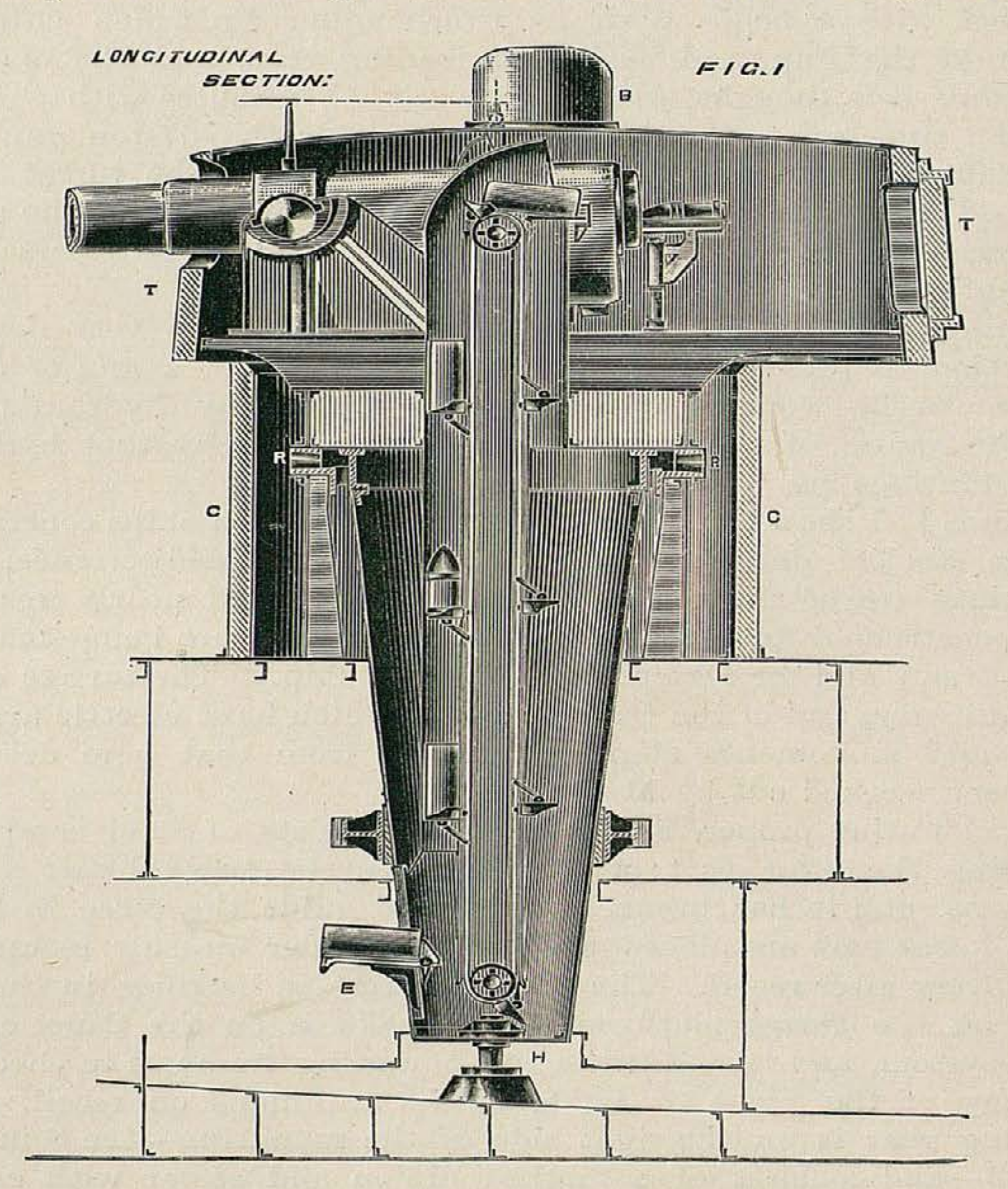
being placed upside down with respect to each other; thus, the right gun can be suited to the left hand position by rotating it on its axis through 180°. The charge is now in one length, and for regular loading in the fixed position the projectile is brought up while the gun is being secured in the loading position. The rammer is provided with a bogie with an overhanging lip which enters the breech of the gun and acts as a loading tray, and the operation of loading, it is thought, will now occupy $1\frac{1}{2}$ minutes with a 50-ton gun, the time up to the present required for the 67-ton gun being $2\frac{1}{6}$ minutes. The gun and loading chamber of the turret are so balanced that the centre of gravity of the mass is in the axis of rotation when the ship is on an even keel; this is necessary for training by hand.

While the provision of alternative hand gear is a very desirable precaution to prevent a possible total breakdown, a gun of 50 ton weight can be worked so much more rapidly by hydraulic gear, that the writer of the work quoted may safely say that hydraulic gun mountings are "not yet doomed."

Figures 1–5 show the designs adopted for the new ships constructed by the Société des Forges et Chantiers de la Méditerranée. The mountings are of the Canet system. The turrets nearly resemble those constructed for the La Touche Tréville, and are being made for the Pothuau and for Danish coast-defence ship. The turrets of the Jauréguiberry, and of the Captain Pratt, which have electric arrangements and movements slightly different from that here described have been worked out by M. Lagane. **Canet's turret electric mountings.**

The mounting proper, shown in figs., consists of steel completely encircling the after part of the gun. In the forward part rest the trunnions, and it has bronze bearings to guide the piece in recoil. In the lower part are placed the brake cylinder and air recuperator for recovery after recoil. The trunnions rest in bearings in the steel frame on the turret platform. The brake is on the Canet central piston system, and is so fixed to the mounting frame as to check the tendency of the piece to rotate on its trunnions on recoil. The elevating gear is on the right side of the mounting—see S in Figs. 2 and 3—and consists of a toothed pinion and sector with endless screw, etc. The turret is constructed for central loading, and the weights are made to balance. The platform, made of sheet steel, carrying the mounting, rests partly on a circle of conical rollers—R R, Figs. 1 and 2—and partly on a hydraulic press H at the base of the central loading tube. On its external circumference is fixed the movable turret armour T T, with a sheet steel roof, in which is an armoured hood B for the head of the man pointing the gun. The

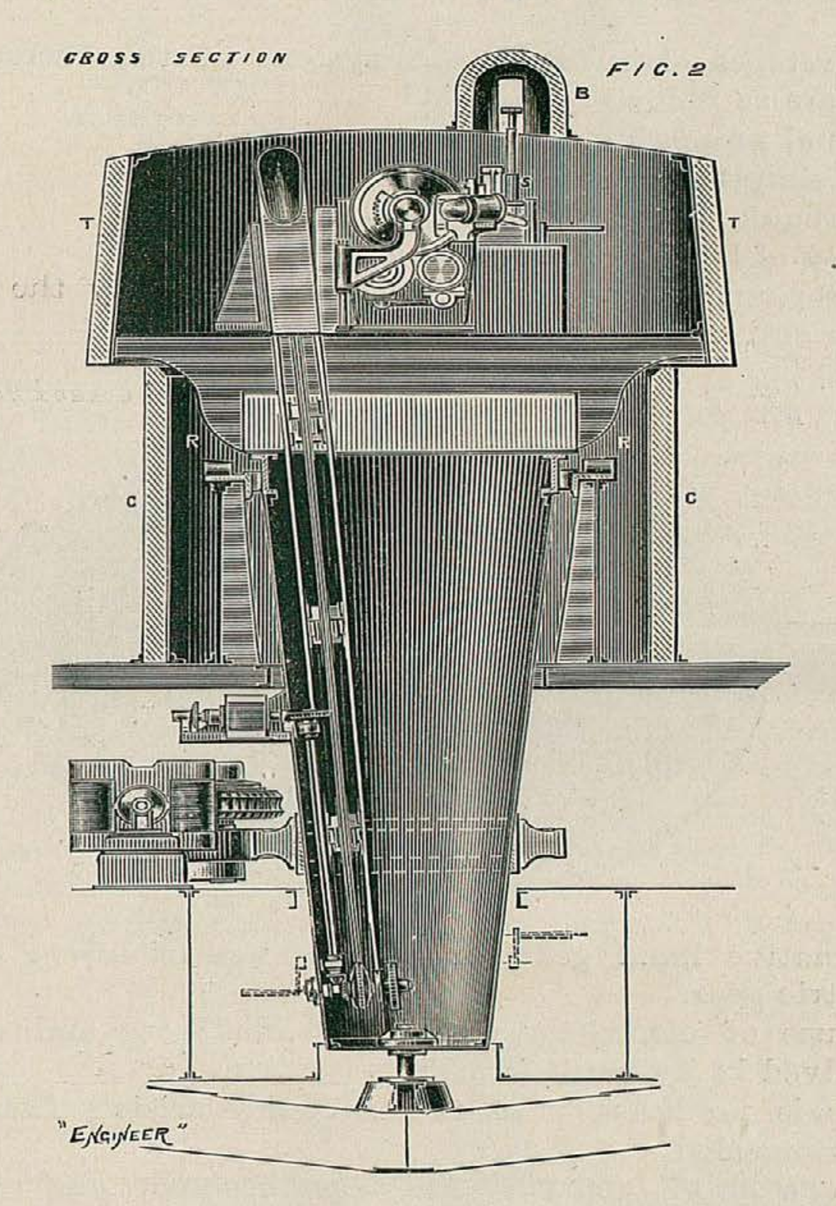
central loading tube is fixed to the floor of the revolving turret, moving with it, the weight of turret and tube being partly borne by the ring of rollers, but chiefly by the press-head forming the pivot at the base. Below the revolving turret armour is a fixed ring C C—Figs. 1 and 2. The gear for revolving the turret is shown at D in Figs. 2 and 4.



The structure on which the conical roller path rests is absolutely independent of the turret sides, and is protected by the armoured circular wall C C. It differs from the disposition of the earlier turrets.

The working machinery includes the elevating and revolving gear, and the loading apparatus. The following features are to be noticed:—(1) The equilibrium of the turret on its own axis of

rotation; (2) the carriage of the tube on a circle of rollers; (3) the support of the chief part of the weight on the hydraulic press. The training gear for rotation of turret includes a toothed wheel fixed on the central loading tube, with pin gear and endless screw, and electric motor. The gear for the motor is wholly contained in a closed cast



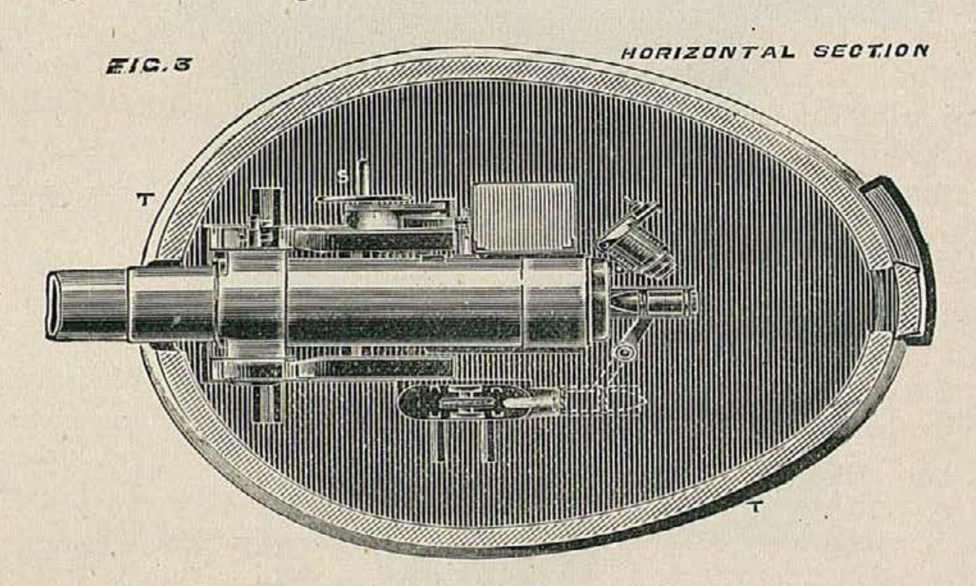
cylinder fixed beneath the platform, connected with a lever worked by the man who points the gun.

The loading apparatus consists of an ammunition chain feed running up the central loading tube, and leading to the side of the carriage, as shown in Figs. 1 and 2 and 5. The ascending feed chain with its charges is enclosed and protected by a brass cover, and projectiles and charges are brought by a hinged stage—see E Fig. 1—to the

lower end of the feed chain, when the first projecting shelf which is brought past it catches it and carries it on up to a table on a bracket, which pivots on a vertical axis, bringing the ammunition to the breech of the gun. The feed can be worked either by electric motor or hand. Electric gear for direction is provided, and alternative hand gear.

The advantages claimed for the system of the turret and gun mountings are as follows :—

1. Effectual protection of gun and carriage.
2. Great simplicity in all parts.
3. Very regular action of brakes.
4. Facility of loading and working.
5. Equilibrium of turret, which facilitates greatly the operations of elevating and training.

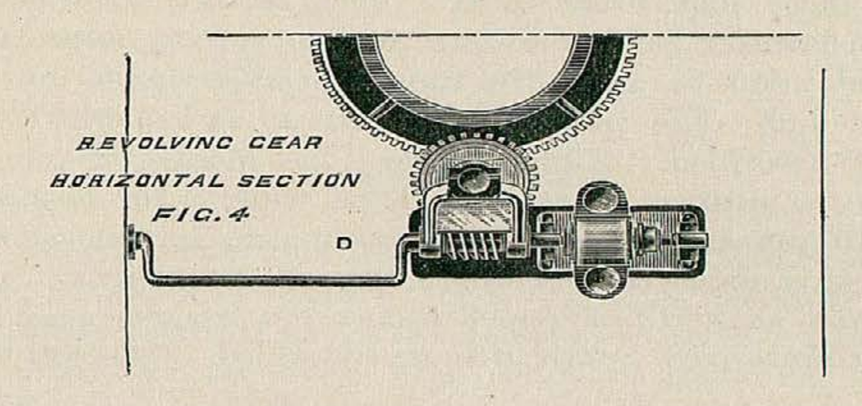


6. Alternative hand gear for use in case of injury being done to the electric gear.
7. The use of electricity gets rid of cumbrous and complicated parts involved in hydraulic working.
8. There is no liability to the difficulty arising from a liquid becoming congealed.

New Whitworth mountings for barbette guns.

A new system of mounting has been designed and made for the 10-inch barbette guns of the Centurion and Barfleur. The firing trials of the latter took place in March last. The guns are constructed to be worked by hand, but in the Barfleur, electro-motors have been procured from Messrs. Siemens Bros. as an alternative power. Thus, without cumbering the barbettes with gear, the gun is worked with ease and speed, being brought from seven degrees of depression to thirty-five degrees elevation in fourteen seconds.

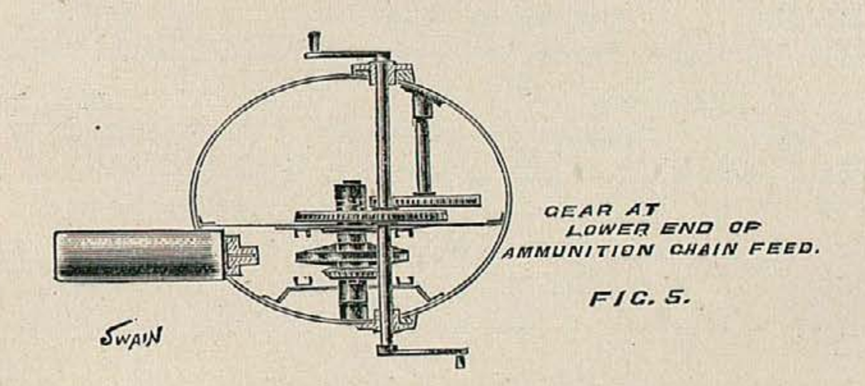
Loading is performed in all positions of training. This is effected by placing a loading chamber beneath the gun platform revolving with it. The ammunition passes up a central tube into the loading



chamber, and from thence up an incline leading to the breech of each gun. The loading chamber extends far below the rollers on which the gun platform revolves, so that the centre of gravity of the system is low, which is advantageous with a revolving structure of small circumference. It will be observed that thirty-five degrees elevation is provided.

Colonel J. B. Richardson, R.A., Commandant of the School of Gunnery, read a paper at the U. S. Institution, on June 28th last, on Coast Artillery practice. He observed that while it might be natural for nations whose fleets might be shut up in harbours to place their coast defence in the hands of their navy, it was otherwise with England, who expected her fleets to be out acting against foreign fleets and shutting them up, it seemed a sound step for her to prepare, by coast defence, against possible raids, and not to copy foreign nations by putting this work on the navy. The paper dealt with

Col. Richardson on Coast Defence.



the artillery defence of coast fortresses and the surrounding area. The lecturer said that steady progress during the last ten years had been made by coast artillery, especially in the organisation

necessary to direct on any required spot an effective fire. Formerly—that is, up to 1883—however good might be the gun drill of individual guns, communications were so defective that a commanding officer had little control over the fire of his batteries. Colonel Richardson gave a telling account of his own experiences when called upon to open fire from batteries under his command some years ago. The present organisation and methods of firing were briefly described. Night defence, the placing of guns, and the use of high explosives were noticed, as well as the actual features belonging to gun fire. The principal consideration suggested to naval officers by this paper is the probability of the progress in our own coast defence, on which Colonel Richardson speaks with authority, having its counterpart in advance more or less corresponding to it abroad.

III.

Quick-Fire Guns.

As time goes on, the quick-fire guns and mountings of different powers will doubtless resemble each other more and more closely, as the value of any good feature is established and as it becomes adopted generally. At present, while very excellent guns and mountings exist in France and Germany, those in England still appear to have the stamp of maturity in a higher degree. If this is correct it will follow that sooner or later experience or science will cause the decisions arrived at in England to be followed abroad. For example, it is due to experience at sea and not on a practice ground, that the charge and projectile are separated in the heavier calibres. Time will show whether this comes in in France and Germany. Two circumstances may delay it; one, that it is only experience at sea that will lead to it, and the other that smokeless powder charges are small compared with those of black or brown powder. Nevertheless, if the reasons governing the separation in England are sound the step will sooner or later follow in the armaments of continental powers. In other matters the same influence is to be traced. In Krupp's Pavilion, beautiful Q.-F. mountings exhibited at Chicago, the piece was controlled and not free to move. It was argued that the movement by gear was extremely good and quick, and this undoubtedly was the case, and that the man, instead of having to steady the gun, could hold himself steady by its means and could point it rapidly by a hand-wheel, acting on worm gear and a ball race, which moved so easily that slow mechanical power was unnecessary. The Elswick mountings can be controlled in all cases, while in pieces below the 6-inch they can be used free if desired with shoulder-pieces. Which is the better plan is a practical question, and practice at sea has governed the decision in England, indeed there is evidence that injustice is unavoidably done to English Q.-F. guns by comparing

England holds the lead in quick-firing guns.

List of Authorities.—"Artillery: its Progress and Present Position," by Lloyd and Handcock, published by Griffin and Co., Portsmouth, for both plates and matter. The *Engineer* for both plates and matter, and the official guide to Krupp's Exhibit at Chicago, where the author of this part of the *Annual* was present, acting as Judge on Ordnance for Great Britain. Also information has been obtained directly from Elswick, Krupp, and Canet, especially with regard to tables of Q.-F. Ordnance.

results obtained at sea with those of experimental tests on the continent. The fixing of the sights is another question. If attached to the gun itself they recoil with it; if on the cradle or fixed part of the carriage they do not move. In the discussion in the French Chamber it was maintained that it was essential to the very claim to quick fire that the "pointer" or "captain" should not be disturbed by recoil, but should keep his eye at the sights throughout. Nevertheless, in only one or two Q.-F. guns exhibited at Chicago was this method of fixing the sights embodied. The language used in France was probably too strong, but it is clearly an advantage to have the sights undisturbed by recoil, and this principle is carried out in English mountings. A more doubtful question is the relative excellence of a pivot revolving on a "live ring of rollers" or a "ball race." Krupp employs the latter, Elswick the former, although in one case the tapered end of a pivot rests on balls. This appearing as it does in a new design (see Plate) would seem to suggest that Krupp was right, but the form in which he employs the ball race is different, and has been tried in England and objected to on the score both of working less well and of expense. At the same time these are both matters which might be capable of improvement by great practice, such as Krupp has undoubtedly had, so that time must show which plan eventually proves to be better. The work brought out under the title "Artillery: its Progress and Present Position," by Captain Lloyd and Mr. Handcock, both on the Elswick staff, gives authoritative information on Elswick designs, so that no apology is called for quoting largely from it.

Elswick Q.-F. mountings.

With regard to the general use and power of Q.-F. guns against torpedo attack, the authors of "Artillery, its Progress and Present Position" quote the instance of destruction of the Blanca Encalada by the Chilian Government torpedo-vessels, Condel and Lynch. The Blanca carried four Hotchkiss six-pounder guns, but no heavy Q.-F. guns. A comparison of the power of ordinary and Q.-F. broadside guns is made as follows: Suppose a torpedo-vessel to come under the fire of three 5-inch ordinary guns at 1700 yards range; she herself running at twenty knots an hour, would be under fire for about two minutes before she reached the striking distance for her torpedoes, which is taken at 400 yards. During this time the three guns in question might deliver twelve shots, or two shots per gun per minute. It is more likely that nine would be actually got off in all, or one-and-a-half per minute from each gun. Three 4·7-inch Q.-F. guns (Armstrong) might deliver seventy-two rounds in all, or twelve rounds each per minute, but would be more likely to get off forty-eight, or eight per minute. It is easy to see that, while a torpedo-

20 PDR. (3-5 IN,) Q.F. GUN ON PEDESTAL MOUNTING WITH 3-IN SHIELD.

Reproduced by permission from "Artillery, its progress and present position." (Lloyd & Hadcock)

20° ELEVATION

7° DEPRESSION

A

H

X

L

S

B

T

EYRE & SPOTTISWOODE, LONDON.

vessel might expect to run the gauntlet through a fire of eight or twelve rounds, it is hardly conceivable that she should get through one of forty-eight or seventy-two.

The introduction of cordite not only got rid of the obstruction due to smoke, but by diminution of the bulk of the charge facilitated the union of charge and projectile necessary for simultaneous loading; nevertheless, the results of a trial of separate *versus* simultaneous loading carried out with the 4·7-inch Q.-F. gun showed that the advantages on each side were more nearly balanced than might be supposed.

With ammunition got up beforehand one round more per minute could be got off with simultaneous than with separate loading. On the other hand, the latter very much lightens and accelerates the work of ammunition supply, by enabling shot and shell to be kept in racks round the gun, so that the cartridges only have to be brought up from the magazine, and thus under service conditions a more rapid fire could be maintained. Objection can hardly be made to this on the score of danger, seeing that in every case a certain number of cartridges must be near the gun in rapid fire. Obturation is more perfect when cartridge and shot are joined together; with separate loading it is not uncommon to see the outer surface of the top of the cartridge case slightly blackened by gas which has found its way between case and bore, but the consideration which has decided the question in favour of separate loading in England is the objection to keeping loaded and fuzed shells in the same magazine with large charges of explosive.

Elswick 6-inch Q.-F. mounting.

Lloyd's work shows an Elswick 6-inch Q.-F. gun on centre pivot-pedestal upper-deck mounting. The springs, to allow these more room, are placed in the cylinder over the gun, where they are no doubt more exposed but more accessible. They are in two sets, one inside the other, and each set is divided into two lengths to facilitate replacing a failing piece. The sights are fixed on the cradle, and do not consequently recoil, so that they can be used without interruption in rapid firing. A special arrangement exists by which sighting can be done through separate appertures without enlarging the gun port, while the sight being brought further forward a wider field of vision is obtained through this aperture. The brackets carrying the cradle of a 4·7-inch Q.-F. gun, and also a 3-inch steel shield are bolted to the roller path which runs on twenty-four steel-flanged line-rollers on a separate ring. The action therefore takes place through the circumference and not the axis of the roller, and the resistance of friction is so little that training can be effected without gearing.

In the 6-inch gun the side-brackets are cast in one piece with the

upper roller-path, and a 3-inch forged-steel shield, forming nearly a complete cylinder, is bolted to the carriage.

For 6-inch and smaller guns, there is a new mounting, in which the cradle trunnions fit into a forged-steel pivot formed like a shaft, with the upper end forked. The lower end rests on a bearing, secured to the base-plate of the cone or pedestal which encloses the pivot, and also forms a bearing for it just under the fork. The shock of firing is thus transmitted from fork to pedestal, but the friction caused by training only acts on the small area of the base of the pivot (see Plate herewith), and is reduced as much as possible by allowing the latter to rest on balls. T in fig. is the training handle. The worm it drives gears into a worm-wheel connected with the pedestal by a frictional arrangement which can be released; by this means the training-gear can be freed, and then the mounting can be pushed round. This condition is the more popular, and probably the training-gear will only be used when the ship is rolling heavily. The shields are attached to the mountings by means of steel brackets or stays, which are bent so as to allow as much elasticity as possible, not in order to spare the shield, for this it cannot do, but to save the mounting. The principle of a double shield, already noticed under the head of armour, is advocated at Elswick for Q.-F. guns, the outer shield opening a shell, and the inner one stopping the fragments. In this case, however, the inner shield is the thicker one.

Schneider Q.-F. ordnance.

In the "Annual" for 1893 was a quoted singularly unfavourable notice of a Schneider Q.-F. gun in the *Marine Française*. In the same article the writer seized the occasion to condemn certain other systems, and also to praise Canet's ordnance in so marked a manner as to make it apparent that he committed himself to the latter system, and sought to advocate its merits. Though the tone of the article was noticed, the reference to it has been regarded as damaging to the Schneider ordnance; and a statement has been received which certainly should be mentioned, because it contains definite facts which admit of proof, and which effectually dispose of the objections so strongly urged against Schneider's system. Certain words of Colonel de la Rocque, president of the commission appointed by the Minister of Marine, were quoted in the discussion of the Marine Budget in the Chamber of Deputies, which may be translated as follows:—"The working of the breech of the Schneider Q.-F. gun resembles that of the Navy, and, in the trial at a fixed and a changing mark, carried out at Creusôt before many spectators, the shots were as rapid and as accurate as with the Canet model." Further, it appears that Schneider 14-C.M. Q.-F. guns were actually ordered for the armament of the Charles Martel, which certainly

ought to be an unanswerable proof of the success with which the design has been brought into actual working shape.

A tubular bullet (the Krnkna-Habler bullet), conical at both ends, with an axial hole of about two-fifths of the calibre, has been tried in Germany. This is found to meet with greatly decreased resistance of the air in flight, and it consequently has a phenomenally flat trajectory. **Small arms.**

ALTERATIONS IN TABLES OF ORDNANCE.

In the *English Table of Naval Ordnance* appears, for the first time, a 12-pr. Q.F. gun, firing with a cordite charge a 12·5 projectile with a muzzle velocity of 2200 ft.-secs. Heavier pieces of a similar character may shortly be adopted. There is also a 12-pr. 8-cwt. boat gun, 29·2 calibres long, of which most of the details are settled, firing a cordite charge. The *French Table of Naval Ordnance* shows a 34-cm. (13·39-in.) gun of great power, discharging a projectile of 1002 lbs. weight, with a muzzle velocity of 2625 ft.-secs. The Table of Elswick quick-firing guns is reconstructed, and may be called a new one, nearly all the pieces shown on it being heavier and far more powerful than their predecessors.

BRITISH RIFLED ORDNANCE.

(Chiefly founded on the official "List of Service Ordnance, 1891," brought out in the Autumn of 1891. Corrected by Official Card List, 1892, and subsequent information.)

Ordnance.											Charge (full).	Projectile.						Ballistics (with full charges).				
Nature.					Chamber.			Rifling.												Perforation of wrought iron.		
								Twist one turn in														
Calibre or Pr.	Weight.	Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Diameter.	Length to base of projectile.	Capacity.	Least at breech.	Greatest at muzzle.	System.†	Weight.‡	Diameter.	Weight.§	Bursting Charge of Common Shell.	Value of $\frac{d^2}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Total muzzle energy.	Muzzle energy per ton of gun.	At muzzle.	At 1000 yards range.	At 2000 yards range.
				calbs.	ins.	ins.	cub. ins.	cals.	cals.		lbs.	ins.	lbs.	lbs.			f. s.	ft. tons.	ft. tons.	ins.	ins.	ins.
B.L. Guns. 16·25-in.	110½ tons.	I.	524·0	30·0	21·125	84·5	28,660	130	30	P.EOC.	960 S.B.C.	16·25	1800	‡‡187½ / **179¼	0·147	0·420	2087	54,390	492	34·2	32·0	30·1
13·5-in.	69 & 67 tons.	I. II. III. & IV.	433·0	30·0	18·0	66·5	17,100	120 or 60	30	P. Rifling increasing twist, in E.O.C. System from 0. Hook Sect. II. from 1 in 60; all others belong to Hook Sect. I.	630 S.B.C.	13·5	1250	**85 9/16	0·146	0·508	2016	35,230	511 / 526	30·1	28·2	26·4
12-in.	45 & 46 tons.	III. IV. V. & V.$_W$	328·5	25·25	16·0	48·0	9,666	120	35		259 P.Br.	12·0	714	31 9/16 / ‡‡95 / **79	0·202	0·413	1914	18,130	403 / 394	22·6	20·6	18·8
10-in.	29 tons.	II. III. III.$_A$ & IV.	342·4	32·0	14·0	54·0	8,370	60	30		252 P.Br.	10·0	500	37¾	0·200	0·500	2040	14,430	498	22·3	20·4	18·6
9·2-in.	21 & 22 tons.	I. & II.	255·8	25·56	11·0	44·0	4,300	118·5	35		140 P.Br.	9·2	380	18½ / ‡‡33	0·223	0·488	1809	8,622	411 / 392	17·9	16·1	14·6
9·2-in.	24 & 22 tons.	III. V. VI. VI.$_A$ & VII.	310·0	31·5	12·0	43·0	4,950	120	30		166 P.Br.	9·2	380	**31 14/16	0·238	0·477	2035	10,910	455 / 496	20·3	18·3	16·6
8-in.	13 & 14 tons.	III.	226·3 / 222·5	25·6	10·5	34·5	3,050	120	35		104 P.Br.	8·0	210	13½	0·305	0·410	1953	5,554	427 / 397	15·4	13·4	11·7
8-in. / 8-in.	15 tons. / 14 tons.	IV. / VI.	254·5	29·6	10·5	38	3,350	110 / 60	35 / 30		118 P.Br.	8·0	210	‡‡29 / ‡‡18½	0·305	0·410	2150	6,730	449	17·1	14·9	12·9
6-in.	80 cwt.	(80 pr.)	165·6	26·0	7·5	27·4	1,155	0	40		34 S.P.	6·0	78·44	6 2/16 / ††7¾	0·450	0·370	1880	1,961	490 / 484	10·5	8·4	6·8
6-in.	89 cwt. / 5 tons.	III. *a* / III. *b*	170·7	25·53	8·0	26·75	1,364	120	35		36 E.X.E. / 48 E.X.E.	6·0	100	7 6/16 / **9 13/16	0·360	0·463	1672 / 1960	1,938 / 2,665	212 / 533	10.6 / 12·4	8.8 / 10·5	7.4 / 8·9
6-in.	5 tons.	IV. / VI.	173·5	26·0	8·0	26·75	1,364	120 / 60	35 / 30		45 P.Bl.	6 0					1870	2,424	485	11.9	10.1	8.4

The Roman numeral is the number of the pattern given.

* Further differences in pattern are indicated by letters A, B, and C. † P. means Polygroove; Pl., Plain; W., Woolwich; F., French; F.M., French modified; H., Henry; E.O.C., Elswick Ordnance Co.

‡ S.B.C. (in column for charge) means Slow-burning Cocoa; P.Bl. stands for Prismatic Black; P.Br. for Prismatic Brown; Pb., Pebble; R.L.G., Rifle Large Grain; L.G., Large Grain; E.X.E., Experimental letter E.

§ For the higher natures the weight of projectile given is for Palliser shot; for the lower natures it is for filled common shell. ** Cast steel. ‡‡ Forged steel. †† Double shell.

a Unchase Hooped. *b* Chase Hooped.

BRITISH RIFLED ORDNANCE—*continued.*

(Chiefly founded on the official "List of Service Ordnance, 1891," brought out in the Autumn of 1891. Corrected by Official Card List, 1892, and subsequent information.)

Ordnance. Nature.	Calibre or Pr.	Weight.	Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Chamber. Diameter.	Chamber. Length to base of projectile.	Chamber. Capacity.	Rifling. Twist one turn in: Least at breech.	Rifling. Twist one turn in: Greatest at muzzle.	Rifling. System.†	Charge (full). Weight.‡	Projectile. Diameter.	Projectile. Weight.§	Projectile. Bursting Charge of Common Shell.	Projectile. Value of $\frac{d^2}{w}$.	Projectile. Value of $\frac{w}{d^3}$.	Projectile. Muzzle velocity.	Ballistics (with full charges). Total muzzle energy.	Ballistics. Muzzle energy per ton of gun.	Perforation of wrought iron. At muzzle.	Perforation of wrought iron. At 1000 yards range.	Perforation of wrought iron. At 2000 yards range.
					calbs.	ins.	ins.	cub. ins.	cals.	cals.		lbs.	ins.	lbs.	lbs.			f. s.	ft. tons.	ft. tons.	ins.	ins.	ins.
B.L. Guns.	5-in.	38 cwt. / 40 cwt.	II. III. IV. & V.	139·15	25·07 / 25·0	5·75	19·05	504	117 / 120	30 / 25	All Hook Section I. or II. P.	15·5 S.P.	5·0	50	4 1/16 / ‡‡6 15/16	0·500	0·400	1770	1,124	590 / 562	8·7	6·8	5·4
	4-in.	23 cwt. / 26 cwt.	II. II.P III. IV. V. & VI.	120·0	27·0	5·3	18·5	417	120	30		12 S.P.	4·0	25	2 14·5/16	0·640	0·391	1900	625	544 / 481	7·2	5·4	4·0
	20-pr. (3·4)	12 cwt.	I. (L.)	107·5	29·0	3·9	15·5	188	120	25		6 S.P.	3·4	19·5	2 1/16	0·593	0·496	1677	380	633	..	..	..
	12-pr. (3·0)	7 cwt.	I. (L.)	92 35	28·0	3·63	11·0	117	120	28		4 S.P.	3·0	12·5	‡‡1 6·5/16 / 10/16	0·720	0·463	1720	249	740	..	..	..
M.L. Guns.	17·72-in.	100 tons.	I. L.	391·8	20·48	19·7	59·72	16,957	150	50	P.Pl.	450 Pr[1] Bl. or Pr[2].	17·72	2000 0	106	0·157	0·359	1548	32,700	327	24·6	22·7	20·9
	16-in.	80 tons.	I.	321·0	18·0	18·0	59·6	14,600	0	50	P.Pl.	450 Pr.[1] Br	16·0	1700 0	75 6/16	0·151	0·415	1540	27,960	350	24·3	22·5	20·9
	12·5-in.	38 tons.	I.	230·0	15·84	Unchambered.			0	35	W.	130 Pr.[2] or 165 Pr.[1] Bl	12·5	818·0	37 8/16	0·191	0·419	1442	11,820	311	17·4	16·0	14·7
	12·5-in.	38 tons.	II.	222·8	15·84	14·0	41·125	6,000	438	35	W.	200 E.X.E 210 Pr.[2] or Pr.[1] black						1575	14,070	371	19·3	17·5	15·9
	12-in.	35 tons.	I. (L.)	195·0	13·54	Unchambered.			0	35	W.	110 Pb.[2]	12·0	714·0	34 10/16	0·202	0·413	1390	9,566	273	15·9	14·5	13·2
	12-in.	25 tons.	II.	182·5	12·09	"			100	50	W.	85 Pb.[2]	12·0	614·0	28 2/16	0·235	0·355	1292	7,190	288	13·4	12·1	11·0
	11-in.	25 tons.	II.	180·0	13·18	"			0	35	W.	85 Pb.	11·0	548·0	27	0·221	0·411	1360	7,028	281	14·2	12·9	11·7
	10-in.	18 tons.	II.	180·0	14·55	"			100	40	W.	70 Pb.	10·0	410·0	23½	0·244	0·410	1379	5,408	300	13·1	11·7	10·5
	9-in.	12 tons.	V.	156·0	13·89	Unchambered.			0	45	W.	50 Pb.	9·0	256·0	17	0·316	0·351	1440	3,681	307	11·4	9·8	8·5
	9-in. ‖	12 tons.	VI. (L.)	156·0	13·89	"			100	35	P.	50 Pb.	9·0	360·0	‡‡27 12/16	..	..	1194	..	..	..	..	..
	8-in.	9 tons.	III.	144·0	14·75	"			0	40	W.	35 Pb.	7·92	179·0	→17 12/16	0·358	0·350	1390	2,398	266	9·7	8·2	7·1
	7-in.	90 cwt.	I.	131·0	15·86	"			35	35	W.	22 Pb.	6·92	114·6	→11 1/16	0·428	0·334	1325	1,395	310	7·9	6·5	5·7
	7-in.	6½ tons.	III.	133·0	15·86	"			35	35	W.	30 Pb.	6·92					1525	1,848	284	9·2	7·2	5·9
	7-in.	7 tons.	IV. L.	148·0	18·0	"			35	35	W.	30 Pb.	6·92					1561	1,936	277	9·4	7·7	6·4
	64-pr.	64 cwt.	III.	118·0	15·47	"			40	40	Pl.	10 R.L.G.[1]	6·28	64·5	→8 8/16	0·588	0·271	1390	865	270	..	..	..
M.L. Guns.	64-pr.	71 cwt.	I.	122·2	16·42	Unchambered.			40	40	Pl.	8¼ R.L.G.[4]	6·29	64·5	→8 8/16	0·588	0·271	1260	715	201	..	..	..
	40-pr.	35 cwt.	II. L.	120·0	22·0	"			35	35	W.	6¾ R.L.G.[4]	4·75	38·8	→3 6/16	0·582	0·362	1425	546	312	..	..	..
	25-pr.	18 cwt.	I. L.	98·0	22·0	"			35	35	W.	4½ R.L.G.[4]	3·94	24·96	→1 13·5/16	0·622	0·408	1350	315	350	..	..	..
	16-pr.	12 cwt.	I. L.	78·0	19·0	"			30	30	F.M.	3 3/16 R.L.G.[4]	3·54	16·1	→1 2/16	0·771	0·366	1355	205	342	..	..	..
	15-pr.	422 lbs.	I. L.¶	70·5	20·0	3·2 (decreased)			60	20	..	1½ R.L. .[2]	3·3	14·25	2 6/16	..	..	1040	113	600	..	..	..
	13-pr.	8 cwt.	I. L.	92·0	28·0	3·15	14·13	110·4	100	30	P.	3¼ R.L.G.[4]	3·0	13·0	11/16	0·689	0·484	1595	232	580	..	..	..
	9-pr.	8 cwt.	I. & II.	72·0	21·17	Unchambered.			30	30	F.M.	1¾ R.L.G[2]	3·0	9·1	→8 12/16	0·996	0·335	1330	119	298	..	..	..
	9-pr.	6 cwt.	I.	61·0	17·67	"			30	30	F.M.	1½ R.L.G.[2]	3·0					1250	97	323			
	9-pr.	6 cwt.	II. / III. IV.	74·5 / 74·875	22·0	"			30	30	F.M.	1¾ R.L.G.[2] / 1½ R.L.G.[2]	2·94	9·1		0·956	0·356	1390	119	397	..	..	..
	2·5-in.	400 lbs.	I. L.¶	70·45	26·6	2·56	11·07	54	80	30	P.	1½ R.L.G.[2]	2·5	7·63	4·5/16	0·819	0·488	1440	101	377	..	..	..
	7-pr.	200 lbs.	IV.	41·0	12·0	Unchambered.			20	20	F.	¾ R.F.G.	2·94	7·29	→ 7·25/16 / 14·5/16	1·185	0·287	950	46	515	..	..	..
R.B.L. guns (screw).	7-in.	82 cwt.	..	120·0	14·21	7·2	16·0	620·0	37	37	P.	11 R.L.G.[2]	7·0	91·25	8 4/16	0·537	0·266	1100	909	222	..	..	..
	40-pr.	35&32 cwt.	..	121·0 & 120	22·39	4·96	13·5	257·8	36½	36½	P.	5 R.L.G.[2]	4·75	40·7	2 6/16	0·554	0·380	1160	380	217	..	..	..
	20-pr.	15&13 cwt.	..	66·125	14·43	3·94	11·0	131·0	38	38	P.	2½ R.L.G.[2]	3·75	21·8	1 5/16	0·645	0·414	1100	183	244	..	..	..
	12-pr.	8 cwt.	..	72·0	20·458	3·2	8·5	66·0	.38	38	P.	1½ R.L.G.[2]	3·0	11·25	8/16	0·800	0·417	1239	200	299	..	..	..
	9-pr.	6 cwt.	..	62·0	17·5	3·2	7·0	55·1	38	38	P.	1¼ R.L.G.[2]	3·0	8.56	6/16	1·052	0·317	1055	66	220	..	..	..
	6-pr.	3 cwt.	..	60·125	21·2	2·625	7·0	37·9	30	30	P.	¾ R.L.G.[2]	2·5	5·46	..	1·145	0·350	1046	41	273			
Quick-firing Guns.												lbs. oz.											
	Hotchkiss . 6-pr.	8 cwt.	I. & II.	97·63	40·0	..	..	..	180	29·9	P.Pl.	1 15 Q.F.	2·24	6·0	..	0·836	0·534	1818	137·5	344·8	3·7	2·4	Mild steel
	Nordenfelt . 6-pr.	6 cwt.	I.	104·4	42·3	..	..	..	180	29·9	P.Pl.	1 15 Q.F.	2·24	6·0	..	0·836	0·534	1837	140·4	468·0	3·7	2·5	
	Hotchkiss . 3-pr.	5 cwt.	I. & II.	80·63	40	..	..	..	25	25	P.Pl.	1 8 Q.F.	1·85	3·3	..	1·037	0·521	1873	80·3	321·2	3·1	1·9	
	Ordnance Q.F. 12-pr.	11¾ cwt.	I.	108·6	40	..	..	..	..	..	..	1 10/16 cordite	3·0	12·5	..	0·667	0·500	2200	423	677	5·4	4·1	3·5
	Ordnance Q.F. 4·7 in.	41 cwt.	I. II. III. & IV. Wire	194·1	40	..	..	..	100	34·4	E.O.C.	12 0 S.P. / 5 lbs. 7 oz. cordite	4·72	45·0	..	0·495	0·428	1786 / 2150	995·4	485·5	8·5	6·0	4·6
	" " 6·0 in.	7 tons	I. II. (Wire) & III.	..	40	..	..	..	..	..	..	29¾ E.X.E. grains.	..	100·0	..	0·360	0·463	1920	2457	..	9·6 ††	8·0	..
Machine Guns.														oz. grs.									
	Nordenfelt, 2 bar. 1-in.	180 lbs.	I.	52·75		..	..	..	35	35	H.	625 M.G.	1·0	7¼ 0	..	2 207	0 453	..	..	..	¼-in. at 200 yards.		
	" 4 bar 1-in.	447 lbs.	III.**	57·0		..	..	..	35	35	H.												
	" 5 bar 0·45-in.	143 lbs.	II. G. G.	42·25		..	..	..	22	22	H.	85 R.F.G_2.	0·450	480	..	2·952	0·751	..	..	..	Same as MH. Rifle, which perforates ⅛ in. wrought iron plate at 600 yds., 3/16 in. at 400 yds., ¼ in. at 100 yds.		
	Gardner, 1 bar 0·45-in.	76 lbs.	G. G.	47·0		..	..	..	22	22	H.												
	" 2 bar 0·45-in.	218 lbs.	..	47·0		..	..	..	22	22	H.												
	" 5 bar 0·45 in.	290 lbs.	I. G. G.	53·5		..	..	..	22	22	H.												
	Gatling, 10 bar 0·65 in.	817 lbs.	..	66·5		..	..	..	30	30	H.	270 R.F.G_2.	0·65	1422	..	2·109	0·730	..	..	..	Not known.		
	" 10 bar 0·45-in.	444 lbs.	G. G.	59·41		..	..	..	22	22	H.	85 R.F.G_2.	0·450	480	..	2·952	0·751	..	..	..	Same as MH. Rifle		
	" (Acclesfeed)	266 lbs.	G. G.	51·0		..	..	..	22	22	H.												
	Maxim, 1 bar 0·45 in.	63 lbs.	G. G.	43·6		.	..	..	22	22	H.												

L., Land-service only, but might concern navy when serving on land. The Roman numeral is the number of the pattern given.

* Further differences in pattern indicated by letters A, B, and C. † P. means Polygroove; Pl., Plain; W., Woolwich; F., French; F.M., French modified; H., Henry. ‡ S.B.C. (in column for charge) means Slow-burning Cocoa; P.Bl. stands for Prismatic Black; P.Br. for Prismatic Brown; Pb., Pebble; R.L.G., Rifle Large Grain; L.G., Large Grain; E.X.E., Experimental letter E. § For the higher natures the weight of projectile given is for Palliser shot; for the lower natures it is for filled common shell. ‖ For high-angle fire. ¶ Mountain-service jointed gun.

** I. and II. differ chiefly in being 7 lbs. lighter; I. has a pitch of rifling of 1 in 60 in.; G.G., Gardner Gatling; H., Henry.

→ Studded projectiles. ‡‡ Forged steel shells. †† By Krupp's formula, 15·63 in. iron, or 12·5 in. steel. With cordite a much higher velocity is obtained.

AUSTRIAN NAVAL ORDNANCE.

	Krupp Steel B.L. Guns.													Uchatius. St., Br.					Cast Iron BL.
Designation by Calibre, in centimètres	30·5	28 L. 22	26 L. 22	24 L. 35 C. 86	24 L. 35 C. 86	24 L. 22	21 L. 20	15 L. 35 C. 86	15 L. 35 C. 80	15 L. 26	15 L. 26	12 L. 35 C. 80	12 L. 35 C. 87	15 L. 25	15 L. 37	12 L. 35	9 L. 24	7 L. 15	15 L. 21
Calibre, in inches	12·01	11·02	10·24	9·45	9·27	9·27	8·24	5·87	5·87	5·87	5·87	4·72	4·72	5·87	4·72	4·72	3·43	2·60	5·87
Length — Total, in Feet	35·11	20·01	18·77	27·60	17·16	15·45	13·73	17·13	17·13	12·63	12·63	13·8	13·8	12·19	14·38	13·97	6·76	3·28	10·13
Length — Rifled Portion, in inches	314·8	169·8	148·4	233·2	135·9	115·3	105·0	151·4	149·6	105·7	111·6	128·5	126·3	111·4	123·2	123·8	57·5	23·8	89·8
Length — Powder Chamber „	69·9	37·4	46·1	69·3	41·7	41·7	37·0	37·8	35·4	29·3	23·4	24·0	26·3	23·6	36·6	31·65	16·5	11·0	18·0
Length — Of bore in calibres	35	18·8	19·0	35	19·2	16·9	17·2	35	31·5	23·0	23·0	32·3	32·3	23·0	37	32·9	21·6	13·4	18·4
No. of Grooves	68	64	32	25	32	32	30	36	36	24	36	32	32	36	32	32	24	18	30
Twist in calibres	..	45	70	26·9	70	64·7	59	45—25	25	68·4	45	25	25	45	45—25	25	45	30	63·2
Weight — Gun, tons	47·8	27·1	21·7	26·5	14·6	14·5	8·68	5·7	4·69	3·94	3·94	2·25	2·46	3·35	3·2	2·85	0·479	0·09	2·81
Weight — Breech Block, in lbs.	..	2315	1951	..	1411	1422	1080	445·3	..	321·9	321·9	..	..	209·4	..	211·6	55·1	18·7	176·4
Weight — Steel Shell „	1003·1	557·8	395·7	474·0	292·1	292·1	206·6	112·5	86·0	72·8	84·9	57·3	57·3	84·9	57·3	57·3	..	..	..
Weight — Chilled Shell „	..	..	..	..	..	308·6	196·2	..	..	..	..	..	..	..	..	..	..	..	..
Weight — Common Shell „	1003·1	488·3	354·2	474·0	263·5	263·5	172·0	112·5	69·9	67·2/65·5	69·4	57·3	57·3	69·45	57·3	57·3	14·02/14·22	6·42	6·11
Weight — Shrapnel Shell „	..	..	..	..	..	..	..	112·5	71·9	67·2/65·5	69·4	57·3	57·3	69·45	57·3	57·3	15·76	6·88	6·79
Weight — Case Shot „	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16·53	6·94	38·4
Weight of Bursting Charge — Steel Shell „	10·6	14·3	8·8	5·1	6·6	6·6	4·4	1·3	1·76	1·65	2·09	0·55	0·55	2·09	0·53	0·55	..	..	..
Weight of Bursting Charge — Chilled Shell „	..	..	..	..	..	3·75	..	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Bursting Charge — Common Shell „	35·7	18·7	20·3	17·9	15·0	15·0	15·0	5·29	3·86	3·86	5·07	2·2	2·2	5·07	2·20	2·21	0·46	0·18	1·87
Weight of Bursting Charge — Shrapnel Shell † in lbs.	..	..	..	..	..	..	..	1·26	1·10	1·08	1·08	0·57	0·57	1·08	0·57	0·57	0·20	0·09	0·90
Weight of Firing Charge — Steel and Chilled Projectile, in lbs.	308·6	123·5*	89·3 B	..	76·1 B	52·9	50·7 C	49·6	38·8	21·6 C	20·9 C	19·8 B	..	20·9 C	30·0 B	19·8 B	..	..	..
Weight of Firing Charge — Common Shell, in lbs.	308·6	123·5*	59·5	..	44·1	44·1	30·9	49·6	38·8	14·3/21·6	20·9 C	19·8 B	..	20·9 C	30·0 B	19·8 B	3·31/0·97	0·77 O/0·35	4·74
Weight of Firing Charge — Exercising, in lbs.	154·3	68·3	59·5	..	44·1	44·1	30·9	28·7	19·6	21·6 C	20·9 C	11·0	..	20·9 C	19·8 B	12·13 B	3·31	0·77 O/0·35	4·74
Weight of Firing Charge — Saluting „	19·8	19·8 O	19·8 O	..	15·4 O	15·4 O	8·82 O	4·74	4·74 O	4·74 O	4·74 O	2·4	2·4	4·74 O	2·4	2·4	0·88 O	0·35	4·74
Muzzle Velocity, in feet	1755·3	1568	1575	..	1421	1378/1345	1519	1883	1969	1641	1562	1738	..	1562	1942·3	1755	1470	978	1017
Muzzle Energy — Total, foot-tons	21,420	9513	6808	..	4087	3847	3306	2767	2312	1358	1435	1201	..	1435	1499	1224	..	..	..
Muzzle Energy — Per inch circumference, foot-tons	567·8	270·4	211·6	..	140·4	132·1	127·7	149·0	125·4	73·7	77·9	81·0	..	77·9	101·1	82·45	..	..	..
Thickness of Iron, perforated inches at Muzzle	24·8	17·0	15·0	..	12·1	11·7	11·6	12·8	11·7	8·8	9·1	9·4	..	9·1	10·54	9·45	..	..	..

NOTE.—P stands for pebble powder; C for cube powder; * prismatic powder; O ordinary powder (inferior); B brown prismatic. † Generally steel.

	Krupp B.L. Guns designated.											Armstrong M.L.					Finspong.
Designation by Calibre	35·5 cm.	30·5 cm.	26 cm. long.	26 cm. short.	21 cm.	15 cm. long.	15 cm. medium.	15 cm. short.	12 cm. long.	12 cm. short.	8·6 cm.	10 in.	10 in.	10 in.	9 in.	8 in.†	6 in.
Calibre, in inches	13·98	12·01	10·24	10·24	8·24	5·91	5·91	5·91	4·72	4·72	3·43	10·0	10 in.	10 in.	9·0	8·0	6·04
Total length, in feet	29·1	22·0	32·8	18·77	24·04	17·1	12·63	10·7	11·8	9·6	6·9	17·0	14·5	14·0	13·0	10·8	9·5
Length of Bore, including Powder Chamber, in inches	304·7	227·2	327·6	194·5	264·5	190·3	135·0	112·9	128·8	102·4	73·6	175·5	145·5	140·0	125·0	104·2	100·8
Length of Bore, including Powder Chamber, in calibres	21·8	18·9	32·0	19·0	35	32·2	22·8	19·1	27·3	21·7	21·3	17·5	14·55	14·0	13·3	13·1	16·7
Number of Grooves	80	68	60	60	48	36	36	36	32	32	24	7	7	7	6	6	6
Twist of Rifling, in calibres	45	45	70–25	45	70–25	70–25	45	45	25	40	45	40	40	40	40	50	40
Total weight, including Breech-gear, tons	51·3	35·4	27·6	21·6	13·3	4·7	4·4	3·5	2·13	1·39	0·49	20·0	18·5	18·0	12·5	8·65	2·46
Weight of Breech Block, lbs.	4695·8	2910	2006	1940	903·9	390·2	330·7	324·1	229·2	176·4	101·4	..	..	..	..	..	..
Weight of Steel Shell, "	1157·4	725·3	451·9	451·9	238·1	112·4	..	86·0	..	44·1	..	400	400	400	..	..	..
Weight of Chilled Shell, "	1157·4	725·3	..	451·9	..	..	86·0	86·0	..	44·1	..	400	400	400	250·2	165·3	..
Weight of Common Shell, "	1157·4	725·3	451·9	451·9	238·1	112·4	69·4	69·4	57·3	36·2	15·2	400	400	400	250·2	131·2	55·1
Weight of Shrapnel Shell, "	1157·4	725·3	451·9	451·9	238·1	112·4	86·0	86·0	57·3	44·1	..	..	..	..	..	..	15·4
Weight of Case Shot, "	..	..	..	..	..	..	..	..	..	..	..	191·8	..	..	154·3	127·9	58·4
Weight of Bursting Charge, Common Shell, "	57·3	39·7	25·4	25·4	12·8	6·2	3·0	3·0	1·7	1·4	0·44	26·5	26·5	26·5	18·5	7·5	5·0
Weight of Firing Charge, Steel or Chilled Shell, lbs.	330·7	180·2	191·8	101·4	105·8	41·9	19·3	21·8	17·4	8·8	..	71·7	71·7	71·7	44·1	29·8	..
Weight of Firing Charge, Common Shell, "	330·7	180·2	191·8	112·4	105·8	41·9	19·3	21·8	17·4	8·8	3·3	71·7	71·7	71·7	44·1	19·8	60·6
Muzzle Velocity, Armour-piercing Projectile, feet	1762	1675	2018	1640	2021	1800	1565	1542	..	1416	..	1457	1368	1368	1368	1378	..
Muzzle Velocity, Common Shell, "	1762	1675	2018	1640	2021	1890	1683	1690	1720	1549	1457	1457	1368	1368	1368	1320	1076
Muzzle Energy, Total foot-tons	24910	14110	12770	8428	6745	2784	1461	1418	..	6130	..	5889	5192	5192	3246	2177	..
Muzzle Energy, Per inch circumference, foot tons	568·3	374·1	396·8	262·0	260·6	150·0	78·7	73·0	..	32·8	..	189·0	165·3	165·3	115·8	86·9	..
Perforation at Muzzle, in inches	24·8	20·0	23·4	16·7	16·9	12·8	9·1	8·8	..	5·8	..	14·1	13·1	13·1	10·9	9·5	..

NOTE.—Chilled projectiles will gradually be replaced by steel.

† There is another Armstrong gun differing very little from this one.

DUTCH NAVAL ORDNANCE.

	Krupp Breech Loading.							Armstrong Muzzle Loading.			Dutch Breech Loading.		
Designation by Calibre, in centimètres	28	21	17	15 No. 1.	15 No. 2.	12 No. 1.	12	28	23	18	12 No. 2.	12l	7·5
Calibre, in inches	11·02	7·91	6·80	5·87	5·87	4·72	4·72	11·00	9·00	7·00	4·72	4·72	2·95
Total Length, in feet	20·01	24·04	13·94	12·63	17·13	6·89	13·78	14·42	13·00	11·00	6·89	13·78	7·87
Length of Rifled Portion of bore, in inches	170·8	222·2	112·7	111·8	151·4	61·4	128·5	119·0	104·0	95·5	61·4	..	43·2
Length of Powder Chamber "	36·4	42·4	36·0	23·2	37·7	13·0	24·0	26·0	21·9	15·5	13·0	..	6·7
Length of bore, in Calibres	18·8	35	21·9	23·0	35	15·8	35	12·1	14·0	15·9	15·8	35	17·5
Number of Grooves	64	48/64	42	36	44	12	32	9	6	3	12	32	20
Depth of Grooves, inches	0·069	0·059	0·118	0·118	..	0·049	..	0·20	0·18	0·18	0·118	0·06	0·049
Twist of Rifling in Calibres	45	∝ 25	45	40	25	40	25	∝ 45	∝ 45	35	40	∝ 45	∝ 30
Total Weight, in tons	27·21	12·79/13·98	5·51	3·94	4·72	0·79	2·26	24·46	12·50	7·17	0·93	2·31	0·21
Firing Charge { Armour-piercing Projectile, in lbs.	121·3	99·2	27·6	20·9	49·6	..	19·8	86·0	50·7	30·0	..	19·5	..
Firing Charge { Common Shell "	121·3	99·2	27·6	20·9	49·6	2·43	19·8	86·0	50·7	13·9	2·43	19·8	0·82
Weight { Armour-piercing Projectile "	560·0	308·6	132·3	86·0	112·2	41·0	57·3	533·5	249·1	114·6	..	57·3	..
Weight { Common Shell "	476·2	308·6	112·4	69·4	112·2	29·5	57·3	535·7	262·4	116·8	29·5	57·3	9·5
Weight { Case Shot "	273·4	..	63·9	41·9	..	26·5	57·3	185·2	149·9	68·3	26·5	..	9·3
Bursting Charge { Armour-piercing Projectile "	6·6	4·6	2·2	1·1	..	0·44	..	4·4	2·2	2·2	..	..	..
Bursting Charge { Common Shell "	26·5	12·3	6·6	6·6	..	2·0	..	28·7	17·6	8·8	1.8	..	0·44
Muzzle Velocity, feet	1558	1739	1558	1558	2001	971	1755	1332	1476	1558	951	1804	958
Muzzle Energy { Total, in foot-tons	9423	6471	2226	1447	3115	..	1224	6563	3763	1929	..	1264	..
Muzzle Energy { Per inch Circumference, foot-tons	272	260·7	104	84	169·0	..	82·5	191	134	89	..	85·2	..
Perforation at Muzzle, in inches	17·0	16·8	10·5	9·1	13·6	..	9·4	14·0	11·9	9·7	..	9·6	..
Metal employed or system of construction	Steel Jacket and Hoops.		Steel-hooped.		Steel Jacket and Hoops.	Steel-hooped.	Steel Jacket and Hoops.	Steel Tube and Wrought Iron.			Bronze.		

NOTE.—The 23-cm. ML. guns also discharge 113-Kg. steel shells and 113-Kg. solid shot. The 18-cm. ML. guns discharge steel shells of 51-Kg. and segment shells of 53-Kg. The 7·5-cm. BL. guns discharge ring-shells of 4·3 Kg. Of the older guns there are yet extant three sorts—rifled 16-cm. muzzle-loader (mostly bronze), rifled bronze 7-cm. and 5-cm.

FRENCH NAVAL ORDNANCE.

Date and Pattern of Gun.	Model 1887.					1870–81.	70–81. 70–84.	81–84.	1884.					1881.									
Desig. by Calibre, in cms.	34	30	27	24	19	27	32	14	34	27	24	16	14	34 long.	34 short.	27	24	16 heavy.	16 light.	14	10	mm. 90	mm. 65
Calibre, in inches	13·39	11·81	10·80	9·45	7·64	10·80	12·6	5·46	13·39	10·80	9·45	6·49	5·45	13·39	13·39	10·8	9·45	6·49	6·49	5·46	3·94	3·54	2·57
Total length, in feet	..	..	..	..	..	23·97	27·93	13·64	..	28·47	24·89	17·04	..	33·69	25·32	27·12	23·70	15·14	15·14	14·3	8·6	7·1	3·58
Length of Bore, in inches	..	..	..	..	..	269·0	313·8	..	..	..	..	..	..	380·6	280·2	306 9	269·3	180·9	180·9	162·6	102·6	77·9	41·2
Length of Bore, in calibres	..	46	46	..	..	24·9	24·9	..	30	30	30	30	31·6	28·4	21·0	28·5	28·5	28·5	28·5	30	26	22	16
Number of Grooves	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	50	50	42	30	28	20
Depth of Grooves, inches	..	..	..	..	..	0·059	0·059	..	..	..	..	..	..	0·067	0·067	0·059	0·055	0·039	0·039	0·035	0·028	0·024	0·020
Rifling Twist	..	..	..	..	..	7°	7°	..	..	..	..	..	..	7°	7°	7°	7°	7°	7°	7°	7°	7°	8°
Total weight, in tons	75·78	44·3	34·1	..	13·8	24·6	42·3	32·0	53·15	27·6	22·64	5·4	3·15	52·2	47·2	27·4	17·7	4·9	3·9	3·2	1·18	0·54	0·09
Weight of Firing Charge: Armour-piercing Projectile lbs.	440·9	..	200·6	..	..	203·9	282·2 / 249·1	27·1	388·0	203·9	..	42·5	..	388·0	337·3	203·9	149·9	42·5	32·6	..	..	..	..
Weight of Firing Charge: Common Shell „	440·9	..	..	..	..	203·9	282·2 / 249·1	27·1	..	203·9	..	42·5	27·1	337·3	368·2	203·9	149·9	42·5	32·6	27·1	9·9	3·6	0·95
Weight: Armour-piercing Projectile * lbs.	881·8	626·1	476·2	..	165·3	476·2	760·6	66·14	925·9	476·2	317·5	99·2	..	925·9	925·9	476·2	317·5	99·2	99·2	..	..	..	..
Weight: Common Shell „	881·8	..	..	..	..	396·8	630·5	66·14	771·6	396·8	264·6	99·2	66·1	771·6	771·6	396·8	264·6	99·2	99·2	66·1	30·9	17·6	5·95
Weight: Case Shot „	..	..	..	..	..	..	..	69·4	..	..	..	..	..	..	..	..	..	130·7	130·7	61·7	39·0	19·5	7·7
Muzzle Velocity, in ft.-sec.	2625	2625	1969	..	2625	1887	1985 / 1804	1936	2133	2067	2067	2001	1969	2067	1804	2034	2034	1969	1821	1936	1673	1493	1135
Muzzle Energy: Total, in foot-tons	42139	29910	12800	..	7894	11760	20780 / 17160	1719	29200	14110	9410	2754	1777	27440	20880	13660	9107	2668	2080	..	..	..	..
Muzzle Energy: Per in. circ., foot-tons	1002	770·0	377·5	..	329·0	346·6	525·0 / 433·5	100·2	694·4	416·0	317·1	135·1	103·9	652·2	496·6	402·6	306·8	130·9	121·3	..	..	..	..
Perforation at Muzzle, inches	33·2	29·1	20·4	..	19·0	19·5	24·0 / 21·7	10·5	27·6	21·4	18·7	12·2	10·7	26·8	23·2	21·0	18·4	12·0	11·5	..	..	..	..
,, ,, ,,	38·9‡	35 7‡	21·1‡	..	22 7‡	..	..	..	30·0‡	22·7‡	19·8‡	12·6‡	..	28·6	..	22 2‡	19·3‡	..	..	..	..	..	..

* Steel or chilled iron. ‡ By Krupp's formula.

FRENCH NAVAL ORDNANCE—*continued.*

Date and Pattern of Gun.	75–79.	Jacketed. 1870.			Jacketed. 70–75	Jacketed. 75	1875.					1870.					
Desig. by Calibre, in cms.	37	32	27	14	27 No. 1	10	42†	34	27 No. 1	27 No. 2	10	32 long.	27	24	19 long.	16	14
Calibre, in inches	14·57	12·6	10·79	5·46	10·8	3 94	16·54	13·39	10·8	10·8	3·91	12·6	10·8	9·45	7·64	6·49	5·46
Total length, in feet	36·7	22·0	17·7	10·3	19·3	9·3	32·5	22	19·3	19·3	9·3	22·0	17·7	16·21	13·6	12·2	10·3
Length of Bore, in inches	414·0	243·6	194·3	115·0	213·4	104·3	366·0	241·5	213·4	214·8	104·3	243·6	194·3	179·1	151·0	137·3	115·0
Length of Bore, in calibres	28·4	19·5	18	21·1	19·8	26·5	22·1‡	18	19·8	19·9	26·5	19·5	18·0	18·1	19·8	21·2	21·1
Number of Grooves	..	64	54	28	54	20	84	68	54	42	20	64	54	48	28	50	28
Depth of Grooves, inches	0·079	0·059	0·059	0·047	0·059	0·032	0·079	0·059	0·059	0·059	0·032	0·059	0·059	0·059	0·059	0·039	0·047
Rifling Twist	7°	4°	4°	4°	4°	7°	7°	4°	4°	4°	7°	4°	4°	4°	4°	7°	4°
Total weight, in tons	75·1	38·8	22·8	2·6	27·9	1·18	74·8	47·6	27·6	24·4	1·18	38·4	22·8	15·4	7·9	4·92	2·66
Weight of Firing Charge: Armour-piercing Projectile * . lbs.	463	189·6	136·7	..	165·3	..	604·1	257·9	136·7	103·6	..	151·0	92·6	62·8	33·1	39·7	..
Weight of Firing Charge: Common Shell „	463	196·2	126·8	13·7	145·5	10·1	..	231·5	121·3	103·6	7·1	151·0	92·6	62·8	33·1	39·7	9·0
Weight: Armour-piercing Projectile . lbs.	1235	760·6	476·2	..	476·2	..	1719·6	925·9	476·2	476·2	..	760·6	476·2	317·5	165·3	99·2	..
Weight: Common Shell „	1014	631·6	396·8	61.7	396·8	30·9	1433·0	771·6	396·8	396·8	26·3	631·6	396·8	264·6	137·8	99·2	46·3
Weight: Case Shot „	..	..	321·9	42·8	321·9	18·7	..	..	321·9	321·9	18·7	..	321·9	211·6	..	68·3	39·7
Muzzle Velocity, in ft.-sec.	1969	1543	1608	1936	1736	1673	1739	1595	1641	1542	1591	1437	1424	1444	1470	1782	1332
Muzzle Energy: Total, in foot-tons	33210	12590	8515	..	9942	..	36040	16320	8865	7852	..	10880	6695	4592	2477	2183	..
Muzzle Energy: Per in. circ., foot-tons	725·4	318	251	..	293	..	695·5	388	261	231·5	..	275	197·3	154·7	103·2	107	..
Perforation at Muzzle, inches	28·2	18·3	16·4	..	17·8	..	27·4	20·3	16·7	15·6	..	16·9	20·53	20·3	10·4	10·8	..

* Steel or chilled iron. † There is also a 42-cm. gun of 20·35 calibres length, in 2 pieces. ‡ Chilled or steel.

GERMAN NAVAL ORDNANCE.

	Krupp Steel Breech-loading Guns, designated by calibre.																								Bronze B.L.
Designation in centimètres	30·5 jack'd.	26 long.	26 jack'd.	26 short.	24 long.	24 short.	21 long.	21 long.	21 short.	21 short.	17 long.	17 short.	15 long.	15 short jack'd.	15 short.	15 short.	15 short jack'd.	15 short jack'd.	12·5 hoop'd.	12 hoop'd.	10·5 long.	8·7	8	8	8
Calibre, in inches	12·01	10·33	10·33	10·33	9·45	9·37	8·24	8·24	8·24	8·24	6·80	6·80	5·87	5·87	5·87	5·87	5·87	5·87	4·92	4·74	3·96	3·43	3·09	3·09	3·19
Length: Total, in feet	21·98	18·77	18·77	17·06	23·63	15·45	24·0	20·61	15·45	12·88	13·94	11·32	14·67	10·73	10·73	10·73	10·68	10·68	9·60	9·6	12·08	6·89	6·89	6·89	5·15
Length: Rifled portion, in ins.	181·9	149·8	150·0	129·3	201·6	116·2	218·2	176·5	124·6	114·9	117·1	102·2	128·5	93·3	87·1	86·7	87·1	86·7	85·7	85·3	113·6	62·7	57·6	57·6	45·9
Length: Powder Chamber†,,	45·3	44·7	44·4	44·7	53·5	40·9	75·3	46·7	37·1	34·0	31·5	16·7	31·1	19·0	25·1	25·5	25·1	25·5	16·7	16·7	19·5	10·7	10·5	10·5	9·73
Length: Bore, in calibres	18·9	18·8	18·8	16·8	26·1	16·8	35·6	27·1	19·6	18·1	21·9	17·5	27·2	19·1	19·1	19·1	19·1	19·1	20·8	21·6	33·6	21·4	22·0	22·0	17·4
Number of Grooves	72	36	48	36	56	48	48	48	30	30	30	·30	36	36	36	24	36	24	32	18	32	24	12	12	12
Depth of Grooves, in inches	0·079	0·077	0·079	0·077	0·059	0·061	0·059	0·059	0·102	0·102	0·063	0·063	0·059	0·061	0·061	0·061	0·061	0·061	0·059	0·051	0·049	0·049	0·049	0·049	0·051
Twist, in calibres	45	50	50	50	25*	45	25*	25*	68	59	45	45*	25*	45	45	68	50	65	40*	60	25*	40*	46	46	46
Weight: Gun, including Breech Gear, tons	35·4	21·7	18·7	17·7	18·7	14·6	13·03	12·3	9·84	8·86	5·51	3·40	4·04	3·44	3·44	3·44	3·15	3·15	1·38	1·35	1·15	0·44	0·32	0·29	0·23
Weight: Breech Block, in lbs.	2954	2050	1973	1973	..	1378	831·1	908·3	831·1	831·1	496·0	414·5	390·2	324·1	324·1	324·1	324·1	381·4	163·1	163·1	149·9	86·0	63·9	63·9	55·1
Weight: Armour-piercing projectile,‡ in lbs.	725·3	412·3	412·3	412·3	474·0	306·4	308·6	308·6	217·2	217·2	117·9	117·9	112·4	76·1	76·1	76·1	76·1	78·3	..	..	..	..	..	..	..
Weight: Common Shell, in lbs.	725·3	357·1	357·1	357·1	474·0	261·5	308·6	308·6	174·2	174·2	112·9	112·9	112·4	65·0	65·0	65·0	65·0	61·1	40·1	33·1	39·7	14·9	9·4	9·4	8·3
Weight of Bursting Charge: Armour-piercing Shell, in lbs.	7·7	5·3	5·3	5·3	6·6	3·2	5·5	5·5	2·8	2·8	1·3	1·3	1·5	0·8	0·8	0·8	0·8	..	..	..	..	..	..	..	..
Weight of Bursting Charge: Common Shell, in lbs.	19·8	14·3	14·3	22·0	15·4	15·4	12·1	12·1	6·6	6·6	5·1	5·1	4·3	4·2	4·2	4·2	4·2	..	2·4	2·5	0·9	0·4	0·4	0·6	0·6
Weight of Firing Charge: Armour-piercing Shell, in lbs.	202·8	105·8	105·8	125·7	152·1	67·2	103·6	103·6	41·9	35·3	30·9	16·5	33·1	14·3	17·1	13·2	17·1	13·2	..	..	..	..	..	..	..
Weight of Firing Charge: Common Shell, in lbs.	202·8	105·8	105·8	125·7	152.1	50·7	103·6	103·6	41·9	35·3	30·9	16·5	33·1	14·3	17·1	12·1	17·1	12·1	8·8	4·6	8·8	3·3	1·1	1·1	0·9
Initial Velocity: Armour-piercing projectile, ft.-sec.	1713	1588	1588	1578	1657	1493	1739	1657	1463	1316	1608	1326	1624	1463	1463	1358	1463	1358	..	....	..	..	..	..	..
Initial Velocity: Common shell, ft.-sec.	1713	1641	1641	1654	1657	1391	1739	1657	1394	1276	1654	1342	1624	1555	1555	1447	1555	1447	1545	1280	1526	1545	1148	1119	1053
Muzzle Energy: Total, foot-tons	14,750	7211	7211	7119	9024	4736	6471	5876	3225	2606	2112	1436	2055	1131	1131	974	1131	1002	..	..	..	..	..	..	..
Muzzle Energy: Per in. circ., ft.-tons	391	223	223	220	304	161	250·0	227	125	101	98·9	67·3	111·5	61·3	61·3	52·8	61·3	54·3	..	..	..	..	..	..	..
Perforation at Muzzle, in ins.	20·5	15·4	15·4	15·3	18·1	13·0	16·4	15·6	11·4	10·1	10·3	8·3	11·0	8·0	8·0	7·4	8·0	7·5	..	..	..	..	..	..	..

Note.—There are also quick-fire guns; see Table of Krupp Q.F. guns. The 30·5, 26, and 24-cm. guns fire steel armour-piercing projectiles.

* Maximum twist. † Including taper entrance into bore. ‡ In most cases steel shells.

ITALIAN NAVAL ORDNANCE.

	Armstrong Breech Loading.				B.L.	Armstrong Muzzle Loading.							Muzzle Loading. Old Pattern.		Breech Loading.		Armstrong Quick Firing.			
Designation by Calibre, in centimètres	43·1‡ New Pattern	43·1‡ Early Pattern 1882.	34·3	12·0	12·0	45·0	27·9 New Pattern.	25·4 No. 1 Long.	25·4 No. 2 Short	25·4 No. 2.	22·8	20·3	16	16	7·5 No. 1.	7·5 No. 2.	15·2†	14·9	12·0*	12·0§
Calibre, in inches	17	17	13·5	4·72	4·72	17·72	11	10	10	10	9	8	6·5	6·5	3	3	6·0	5·87	4·7	4·7
Length: Total, in feet	40·75	39	36·09	8·5	9·25	32·7	14·4	14·4	14	13·8	13·8	10·8	11·8	10·6	5·8	3·3	13·8	13·87	16·2	13·0
Length: Rifled Bore, in inches	346·8	315·7	..	75	88	302	121	120	114	112	106	89	96	87	52	27	126	..	189	..
Length: Powder Chamber, in inches	84·5	98	..	10·8	22	56·5	24·5	26·0	26·0	14·0	19·5	15·7	21·3	21·3	10·2	7·9	28	..		..
Length: Bore, in Calibres	27	26	..	20·2	23·5	20·5	13·2	14·6	14·0	12·6	13·9	13·1	16·8	15·5	20·7	11·7	26	..	40	35
No. of Grooves	82	82	56	37	36	28	9	7	7	8	6	6	6	6	12	12	28	28	22	22
Twist of Rifling, in Calibres	50	50	..	40	42	50	35	40	40	55	45	45	42·5	27·3	48	48	40	40	34·4	..
Total Weight, in tons	104·3	101·5	67·9	1·20	1·38	100	25·0	18·0	18·1	12·1	12·6	6·99	5·12	3·54	0·29	0·095	4	4·2	2·05	1·69
Firing Charge: Armour-piercing projectile, lbs.	900·0	725	630·5	5·5	9·9	551	95·2	77·6		63·9	59·7	37·7	19·8	..	..	..	39 7	26·5	12·0	..
Firing Charge: Common Shell, „	600	480	..	5·5	9·9	63·0	66·6	52·9		41·9	37·7	26·7	7·3	7·1	1·9	0·7	26·5	40	12·0	..
Weight: Armour-piercing projectile, „	2000	2000	1250	52·0	52·2	2000	540·1	451·9		331·8	315·3	191·8	103·6	..	..	..	80	about 80·0	45·0	36·0
Weight: Common Shell, „	2000	2000	1250	31·7	36·8	2000	526·9	399·0		284·4	250·0	180·0	64·6	65·7	9·4	9·4	80		..	36·2
Weight: Shrapnel „	2017	2017	1250	37·3	37·37	2180	533·5	399·0		284·4	250·0	180·0	68·3	..	9·4	9·4	80		..	29·8
Weight: Case Shot „	..	..	..	32·4	35·9	..	200·1	188·1		135·6	99·6	79·4	33·1	33·1	9·0	9·0	70	..	..	..
Bursting Charge: Armour-piercing projectile, „	32	32	17·4	2·31	2·31	32 ?	15·0	12·3		8·4	6·5	3·8	..	..	..	..	1·5	..	..	1·83
Bursting Charge: Common Shell, „	60	60	87·1	2·2	2·2	78 ?	26·0	23·8		18·2	18·8	9·7	2·87	2·87	0·31	0·31	5	..	..	3·02
Bursting Charge: Shrapnel „	5	5	4·25	0·35	0·35	5 ?	2·2	2·20		1·96	1·80	1·17	0·55	..	0·03	0·03	0·16	..	..	0·35
Muzzle Velocity, in feet	1992	1935	2016	1345	1591	1700	1353	1388		1373	1284	1311	1290	1024	1335	..	1946	..	1786	..
Muzzle Energy: Total, foot-tons	55,030	51,930	35,230	650·4	916·4	40,060	6857	6035		4369	3604	2286	1195	..	..	..	2100	..	995·4	..
Muzzle Energy: Per inch circumference, foot-tons	1035	976·3	830·8	43·9	61·8	753·4	198·5	192·2		139·1	127·6	91·0	58·5	..	..	..	114·1	..	67·1	..
Perforation at Muzzle, inches of iron	33·7	32·8	30·2	6·7	8·1	28·5	14·3	14·1		12·0	11·4	9·6	7·7	..	..	..	11·2	..	8·6	..
Metal employed in structure	St.	I. & St.		St.	St.	Steel tube in Wrought Iron jacket.							I. & St.	Cast I.	Br.	Br.			St.	

St. stands for steel, I. for iron, Br. for Bronze.

* For Piemonte. † For Piemonte, Fieramosca, Re Umberto, Ancona, Doria.

‡ There are four types of these bores, viz.: types Lauria, Lepanto, Italia, Valente. § For Duilio, Dandolo, Formidabile.

RUSSIAN NAVAL ORDNANCE.

	Obuchoff Steel Breech Loading Hooped Guns.																Steel B.L. Guns.		
Designation by Calibre, in inches	12	12 Long.	12 M. 77.	11 M. 67.	11 Pattern 77.	9	9 M. 67.	9	8	8	8 M. 67.	6	6 Long.	6·03	6	Long 9-pdr.	4·2 (9-pdr.)	3·43 Long (4-pdr.)	3·43 (4-pdr.)
Calibre in centimètres	30·48	30·48	30·48	27·94	27·94	22·86	22·86	22·86	20·32	20·32	20·32	15·24	15·24	15·32	15·24	10·67	10·67	8·70	8·70
Total Length, in feet	**35	30	20	18·3	20·0	**26·25	15·0	13	**23·33	**20	14·6	**17·5	14	12·2	11·7	6·9	7·0	6·9	5·8
Length of Rifled Portion of Bore, in inches	..	..	165·0	152·0	158·0	..	124·0	..	..	..	128·0	..	118·7	106·0	98·0	61·5	65·0	62·6	53·0
Length of Powder Chamber, in inches	..	..	38·5	35·0	50·4	..	28·5	..	..	..	23·0	..	30·5	22·4	22·2	10·5	8·0	10·7	..
Length of Bore in calibres, including Powder Chamber	**35	..	17	17	18·9	**35	16·9	..	**35	**30	18·9	**35	24·9	21·3	20	17·1	17·4	21·4	..
Number of Grooves, in inches	..	..	36	36	64	..	32	32	..	..	30	..	..	24	24	24	16	24	12
Depth of Grooves "	..	0·070	0·135	0·135	0·135	..	0·110	0·110	..	..	0·090	..	0·060	0·085	0·070	0·055	0·055	0·050	0·050
Twist of Rifling in calibres	..	..	73·5	70	..	..	60	60	..	..	70	..	*24	60	68	*40	50	40	41
Total Weight, in tons	55·7	50·45	39·9	28·2	28·2	19·44	15·0	12·5	13·64	12·74	9·67	6·26	4·08	4·35	4·03	0·60	0·87	0·45	0·35
Weight of Steel Shell, in lbs.	..	..	665·8	515·9	..	..	249·1	275·6	..	..	172·0	..	90·9	97·6	86·0	..	..	..	..
Weight of Chilled Shell, "	..	731·9	665·8	515·9	562·2	..	275·6	264·7	..	193·1	169·8	..	119·0	86 0	86·0	..	..	..	..
Weight of Common Shell, "	626·4	..	639·3	496·0	520·3	268·2	266·8	266·8	192·3	172·4	172·0	73·35	..	81·6	81·6	27·6	24·2	15·2	12·6
Weight of Case Shot, "	..	..	293·2	216·1	..	..	176·4	176·4	..	..	134·5	..	..	57·3	57·3	27·6	22·3	15·2	11·0
Weight of Firing Charge. Steel Shell, "	..	..	144·4	115·3	..	..	64·2	47·0	..	..	31·5	89·38	..	14·3	18·1	..	..	..	..
Weight of Firing Charge. Chilled Shell, "	..	246·9	144·6	90·6	132·2	..	47·0	47·0	..	72·0	29·3	39·6	37·8	14·3	18·1	..	..	..	..
Weight of Firing Charge. Common Shell, "	..	..	117·3	81·6	132·2	180	42·1	42·1	88·2	72·0	28·4	39·6	..	10·8	14·3	4·5	2·6	3·1	1·3
Muzzle Velocity, in feet	..	1942	1470	1486	1516	2376	1463	1260	1925	1796	1352	2080	‡1739	1206	1463	1225	..	1444	..
Muzzle Energy. Total, foot-tons	..	19140	9974	7903	8960	10500	4095	3035	..	4321	2180	2682	1905	982	1276	..	..	..	..
Muzzle Energy. Per Inch Circumference, foot-tons	..	508·4	264·6	228·8	259·3	371·4	144·7	107·4	..	172·0	86·7	142·3	101·1	51·8	67·74	..	..	..	..
Perforation † at Muzzle, in inches	..	23·6	16·7	15·5	16·5	20·2	12·3	10·5	..	13·5	9·5	12·50	10·5	7·2	8·4	..	..	..	..

** It is doubtful if this refers to the total length of gun or of bore. * Maximum of increasing twist. † Through iron unbacked.
‡ With pyroxiline.

SPANISH NAVAL ORDNANCE.

	Hontoria, Pattern 79.		Hontoria, Pattern 83.								Armstrong, Pattern 83.						Armstrong.			Krupp.				Ordonnez.	
	B.L.		Breech Loading.														Muzzle Loading.		Pattrn 81 B.L.	Breech Loading.				B.L.	
Designation by Calibre	18-cm	16-cm. No. 1.	32-cm.	28-cm.	24-cm.	20-cm.	18-cm.	16-cm.	14-cm.	12-cm	24-cm.	20·3-cm	15-cm.	12-cm.	8·4-cm	7·5-cm long.	22·86-cm	20·3-cm	6-in.	15-cm.	12-cm.	8·7-cm	7·5-cm	24-cm.	21-cm.
Calibre, in inches	7·09	6·34	12·60	11·02	9·45	7·87	7·09	6·34	5·51	4·72	9·449	8·00	6·00	4·72	3·3	2·95	9·00	8·00	6 00	5·87	4·72	3·43	2·95	9·45	8·27
Length: Total length, in feet	15·57	13·8	38·7	33·8	29·0	..	21·75	19·3	16·91	14·5	29	18·4	17·00	13·75	7·9	7·51	13·0	11·9	14·5	17·13	11·81	6·9	6·3	..	..
Length: Rifled Portion, in inches	141·2	125·6	352·4	309·1	..	..	..	170·6	149·1	126·0	260·2	162·0	158·3	135·8	75·0	70·7	104·0	102·0	126·9	..	..	..	57·6	..	..
Length: Powder Chamber, in inches	..	31·9	86·8	77·1	..	..	..	49·8	53.9	39·4	66·9	43·5	31·4	19	13	13	..	..	29·7	..	..	..	..	35	35
Length: Bore, in calibres	..	25	50	50	30	..	30	35	35	35	35	26	32	33	27	28·7	14	14·75	26·1	35*	30*	24*	25·8*	..	..
No. of Grooves	42	38	80	70	60	50	45	40	35	30	60	33	28	22	20	18	6	4	28	36	32	24	24	..	..
Depth of Grooves, in inches	0·06	0·06	0·06	0·06	0·05	0·06	0·04	0·04	0·04	0·04	0·05	0·03	0·037	0·03	0·03	0·03	0·18	0·18	..	0·06	0·06	0·05	0·05	..	..
Twist of Rifling, in calibres		Increasing from 100 to 49.	From 0 to 30.								30	45	30	40	30	35	45	40	100 to 40	25	25	40	36	24·3	16·3
Total Weight, in tons	7·87	5·6	48·2	32·5	20·7	11·5	8·77	6·1	4·1	2·6	21	11·5	5·0	2·2	0·45	0·35	12·5	9·0	4·0	4·6	2·1	0·49	0·30	..	..
Weight: Armour-piercing projectile, in lbs.	135·6	93·7	1041	837·8	438·7	253·5	187·4	130·1	86·0	53·1	445	180	100·0	40·0	..	..	2500	180·0	78·0	85·10	43·65	..	..	429·9	286·6
Weight: Common Shell, in lbs.	120·4	78·3	879·6	586·4	370·4	..	..	112·4	75·0	47·2	393	180	100·0	40·0	15·0	12·0	2500	180·0	83·6	65·70	34·61	14·6	9·48	..	..
Weight: Ring Segment, in lbs.	..	83·8	886·3	590·8	370·4	..	..	112·4	75·0	47·6	..	..	..	40·0	15·0	12·0	..	..	..	..	34·61	14·6	9·04	..	..
Firing Charge: Armour-piercing projectile, in lbs.	..	26·5	485·0	352·7	220·5	127·9	94·8	66·1	44·1	28·7	220	90	55·0	16·0	..	..	50·0	35·0	34·0	37·48	19·29	..	..	154·3	99·21
Firing Charge: Other projectiles	..	24·3	..	..	..	..	..	61·7	..	28·7	145	65	34·0	12·0	4·0	3·75	33·0	21·0	39·0	..	..	10·3	10·4	..	..
Muzzle Velocity, in feet	..	1631	2034†	2034†	2034†	..	2034	2028	2034	1988	1950	2020	2070	2000	1625	1709	..	..	1936	2001	1887	1539	1552	1772	1706
Muzzle Energy: Total, in foot-tons	..	1729	29850	2403	12580	..	5374	37·10	2466	1511	11730	5094	2972	1109	275	243	..	..	2027	2362	1076	..	..	9363	5782
Muzzle Energy: Per inch circumference, foot-tons	..	87·4	754·3	694·0	423·9	..	241·4	186·3	142·4	101·9	397·4	203·8	156·4	75·15	..	..	..	..	1075	128·1	72·6	..	..	315·4	222·6
Perforation at Muzzle, in inches	..	9·6	28·8	27·6	21·6	..	16·3	14·3	12·5	10·5	20·9	15·0	13·22	9·09	..	..	..	..	10·9	11·9	8·93	..	..	16·9	14·2
Metal and Construction	St. & Cast I		St. Jacket and Hoops.								St.						St. and Wt. I.		St.	St.				St.	

18 and 16-cm. Palliser guns and 16 and 13-cm. Parrot guns also exist. St. stands for Steel; I. for Iron. There is also a 20-cm. (7·87-in.) B.L. Hontoria, Pattern 79, weighing 10·8 tons, firing an armour-piercing projectile weighing 180·8 lbs. with a charge of 61·73 lbs., and an Ordonnez 30·5-cm. (12·0-in.) gun, firing an 838-lb. projectile with a velocity of 1706 ft.-secs., as well as two lighter pieces. * Total length, the length of bore not being supplied. † These figures are probably estimated, and the power of the guns so great as to be out of the question; compare with British, French or German guns, and the mistake is apparent.

NAVAL ORDNANCE OF SWEDEN AND NORWAY.

	Sweden.													Norway.										
	Breech Loaders.			Model 76.		Model 81.		Model 83.		M. 85.	M. 86.	M. 89.	M. L.	Krupp, B.L.					Armstrong, M.L.				Palliser, M.L.	
Designation by Calibre, in cms.	27	24	17	27	24	27	12	15	8	25	6·5	15	12	26	26	15	12	12	26·7	26·7	26·7	20·2	16·7	15·5
Calibre, inches	10·80	9·45	6·58	10·80	9·45	10·80	4·72	6·00	3·31	10·00	2·60	6·0	4·80	No. 2. 10·24	No. 1. 10·24	5·91	No. 2. 4·72	No. 1. 4·72	No. 3. 10·51	No. 2. 10·51	No. 1. 10·51	7·94	6·58	6·11
Total Length, feet	17·46	14·96	11·27	17·65	16·24	23·10	10·29	13·87	7 37	28·33	3·79	16·98	8·87	25·59	18·77	12·63	13·78	9·60	16·87	14·65	13·45	10·82	11·58	10·30
Length: Rifled Portion of Bore, ins.	160·8	137·0	107·8	159·2	150·5	191·6	94·5	124·1	71·3	2609	35·0	155·2	83·3	218·9	160·4	112·4	128·6	85·9	138·7	121·0	110·6	85·7	92·4	91·7
Length: Chamber, "	29·9	25·9	16·5	32·3	28·1	66·2	20·6	31·1	9·7	58·1	4·2	35·2	13·6	55·4	34·1	22·6	36·8	16·5	36·8	24·0	20·6	18·5	19·3	10·8
Length: Bore in calibres, "	17·2	17·1	18·7	17·8	18·9	23·9	24·0	25·7	24·3	32·9	15·4	32	20·2	30	19·0	22·8	35	25	16·7	13·8	12·5	13·2	17·0	16·8
Number of Grooves	5	5	5	42	36	45	30	28	24	42	26	28	8	60	60	36	32	32	8	8	8	6	3	3
Twist of Rifling	30*	30*	30*	45*	..	40*	30*	30	33*	40*	22*	30	40	∝25	45	45	∝25	40	55	55	55	50	34	34
Total Weight, tons	23·6	14·4	5·2	23·6	16·4	27·1	1·9	4·2	4·2	29·8	9·4	5·2	1·9	24·8	21·7	3·9	2·31	1·38	21·7	19·7	18·2	7·4	4·9	3·4
Weight of: Armour-piercing Shell in lbs.	476·2†	317·5†	107·1†	476·2†	317·5†	476·2†	..	100·0	..	449·7	..	100	..	606·3	463·0	86·0	57·3	44·1	448·6	393·5	384·9	157·4	109·8	..
Weight of: Common Shell, in lbs.	396·8	224·9	97·7	396·8	273·4	396·8	48·5	100·0	14·8	401·2	6·2	100	34·6	606·3	381·4	69·4	57·3	36·1	316·4	316·4	316·4	153·9	82·7	59·1
Weight of Firing Charge: Armour-piercing Shell, in lbs.	83·8	59·5	22·0	90·4	56·2	206·4	..	35·3	..	242·5	..	54·0	..	191·8	99·2	22·0	19·8	9·9	110·2	82·7	66·1	29·8	22·0	..
Weight of Firing Charge: Common Shell, lbs.	83·8	59·5	22·0	90·4	56·2	145·5	16·0	35·3	3·3	242·5	0·9	..	6·6	191·8	81·6	20·9	19·8	9·9	77·2	77·2	48·5	29·8	16·5	7·72
Muzzle Velocity, feet.	1322	1312	1365	1378	1365	1788	1640	1663	1542	2100	1148	2067	..	1722	1575	1624	1804	1493	1549	1444	1296	1247	1329	1116
Total foot-tons	5771	3789	1384	6272	4102	10550	..	1918	..	13750	..	2964	..	12460	7966	1573	1290	680	7463	5692	4484	1696	1345	..
Muzzle Energy: Per inch Circumference.	170·1	127·6	66·9	184·9	138·2	311·3	..	101·7	..	437·7	..	157·2	..	387·4	247·7	84·7	87·1	45·9	226·0	172·4	135·8	68·0	65·1	..
Muzzle Energy: Perforation through Iron	13·19	11·4	8·3	13·8	11·9	18·4	..	10·4	..	21·9	..	13·1	..	20·4	16·2	9·5	9·7	7·0	15·5	13·4	11·8	8·3	8·2	..

Sweden.—The breech-loaders have breech screw-stoppers. The whole of the guns also discharge case-shot, and the 12-cm. discharge also shrapnel.

Norway.—Besides the chilled shell, there are also chilled solid shot for the 8·5-in. and the 6·5-in. guns, and for all muzzle-loaders case-shot also, and steel shrapnel for some Krupp guns.

* Maximum rate of increasing twist. † Solid shot.

UNITED STATES NAVAL ORDNANCE.

NATURE OF GUN.	Calibre.	Weight.	Total Length.	Total Length of Bore.	Length of Rifling.	Twist of Rifling.	Length of Chamber.	Weight of Service-charge.	Weight of Projectile.	Muzzle Velocity (Service).	Muzzle Energy.	Perforation of Wrought Iron at Muzzle.
	inch.	tons.	feet.	inch.	inch.		inch.	lbs.	lbs.	ft.-seconds.	ft.-tons.	inch.
4-in. B.L.R., Mark I.	4	1·5	13·7	157·3	130·3	zero to 1 in 25	24·7	12 to 14	33	2000	915	8·9
4-in. R.F.* Gun	4	1·5	13·7	157·5	128·1	..	25·4	..	33	2000	..	8·9
5-in. B.L.R., Mark I.	5	2·8	13·5	150·3	120·8	1 in 180 to 1 in 30	27·1	26 to 29	60	2000	1,660	10·8
5-in. R.F.* Gun	5	3·1	17·4	191·5	164·4	zero to 1 in 25	32·0	28 to 30	50	2250	1,754	11·1
6-in. B.L.R., Mark I.	6	4·8	15·8	176·0	136·7	1 in 180 to 1 in 30	36·9	50	100	2000	2,773	12·7
6-in. B.L.R., Mark II.	6	4·9	16·1	180·1	144·9	..	32·7	45 to 48	100	2000	..	..
6-in. B.L.R., Mark III., of 30 Cals.	6	4·8	16·3	183·8	147·3	zero to 1 in 25	34·0	44 to 47	100	2000	..	..
6-in. B.L.R., Mark III., of 35 Cals.	6	5·2	18·8	213·8	177·3	..	34·0	..	100	2080	2,990	13·2
6-in. B.L.R., Mark III., of 40 Cals.	6	6·0	21·3	243·8	207·3	..	34·0	..	100	2150	3,204	13·7
8-in. B.L.R., Mark I.	8	12·3 / 12·9	21·5	239·9	195·2	1 in 180 to 1 in 30	42·1	105 to 115	250	2000	6,932	17·4
8-in. B.L.R., Mark II.	8	13·0	21·5	239·9	195·2	..	42·1	..	250	2000	..	17·4
8-in. B.L.R., Mark III., of 35 Cals.	8	13·1	25·4	290·5	242·8	zero to 1 in 25	45·1	..	250	2080	7,498	18·1
8-in. B.L.R., Mark III., of 40 Cals.	8	15·2	28·7	330·5	282·8	..	45·1	..	250	2150	8,011	18·7
10-in. B.L.R., Mark I., of 30 Cals.	10	25·7	27·4	306·3	247·3	1 in 180 to 1 in 35	57·2	225 to 240	500	2000	13,864	22·03
10-in. B.L.R., Mark I., of 35 Cals.	10	27·1 / 28·2	30·5	343·8	283·8	zero to 1 in 25	57·2	..	500	2080	14,996	22·9
10-in. B.L.R., Mark II., of 30 Cals.	10	25·1	27·4	307·3	247·3	zero to 1 in 26·8	57·2	..	500	2000	13,864	22·03
10-in. B.L.R., Mark II., of 35 Cals.	10	27·6	31·2	354·9	294·9	zero to 1 in 25	57·2	..	500	2100	15,285	23·1
12-in. B.L.R., Mark I.	12	45·2	36·8	419·2	343·1	..	74·1	425	850	2100	25,985	27·5
13-in. B.L.R., Mark I.	13	60·5	40·0	454·5	370·5	..	80·9	550	1100	2100	33,627	30·1

* R.F., Rapid or Quick-fire.

NOTE.—The weight of fixed ammunition for R.F. 4-in. and 5-in. guns is 58 and 95 lbs. respectively. A 16-in. gun of 110 tons weight is under consideration.

ELSWICK QUICK-FIRING GUNS.

Diameter of Bore	Inches	1·46	1·46	1·85	2·24	2·24	2·75	3·0	3·5	3·75	4		4		4·7	* 4·7	4·7	6	6	6	† 8		† 8	
do. do.	m.m.	Hotchkiss 37	Hotchkiss 37	Hotchkiss 47	Hotchkiss 57	Hotchkiss 57	70	76·2	88·9	95	100		100		120	120	120	152	152	152	203		203	
Length of Bore	Calibres	20	25	40	40	50	30	40	40	40	40		50		40	40	50	40	40	50	40		40	
do. Gun	do.	22·7	27·8	43·6	43·6	53·6	31·4	41·2	41·3	41·4	41·3		51·3		41·1	41·2	51·2	41·54	41·54	51·54	41·63		41·63	
Weight of Gun		lbs. 73	lbs. 79	lbs. 506	lbs. 800	cwts. 10	cwts. 7	cwts. 11·8	cwts. 24	cwts. 33	cwts. 32		cwts. 35		cwt. 42	cwts. 49	cwts. 55	tons. 5·8	tons. 6·6	tons. 8	tons. 15·5		tons. 15·5	
do. Projectile	lbs.	1·1	1·1	3·3	6	6	10	12·5	20	25	25	30	25	30	45	45	45	100	100	100	210	250	210	250
do. Charge	..	ozs. 2·8	ozs. 0·81	ozs. 7·4	ozs. 8·8	..	lbs. 0.94	lbs. 1·68	lbs. 3·75	lbs. 4.5	lbs. 5	lbs. 5	lbs. 5	lbs. 5	lbs. 5·68	lbs. 8·8	lbs. 8·8	lbs. 15	lbs. 19·4	lbs. 19·4	lbs. 32	lbs. 32	lbs. 44	lbs. 44
Muzzle Velocity	f.-s.	1319	1551	2150	1940	2592	1900	2200	2420	2400	2540	2320	2650	2420	2230	2500	2630	2220	2500	2610	2242	2055	2570	2355
Velocity at 2,500 Yards	f.-s.	..	..	936	966	1172	983	1084	1256	1348	1251	1348	1386	1406	1320	1481	1564	1517	1706	1784	1626	1572	1850	1793
Muzzle Energy	f.-t.	13·3	18·3	105·8	156·6	279·5	250·3	419·5	812·2	1000	1118	1120	1217	1218	1552	1950	2158	3417	4334	4906	7319	7321	9618	9614
Energy at 2,500 Yards	f.-t.	..	..	20·1	38·8	57·2	67	102	219	302	271	378	333	411	544	684	763	1596	2018	2207	3850	4284	4983	5573
Penetration at Muzzle **	inches	1·0	1·5	4·3	4·4	6·0	4·9	6·4	8·7	9·4	9·7	9·7	10·2	10·2	10·6	11·9	12·5	13·9	15·6	16·6	17·6	17·6	20·1	20·1
do. do. ‡	..	..	..	5·2	..	8·6	..	8·1	10·9	11·6	11·7	11·8	12·5	12·5	12·3	14·6	15·7	16·4	19·5	20·8	20·2	20·2	24·8	24·8
Rounds per Minute	..	..	..	30	25	25	25	20	15	15	15	15	15	15	12	12	12	7	7	7	4	4	4	4

* { 5 Rounds were fired from this gun at a target range 1000 yards in 22 Seconds. 1st round, target struck. 2nd round, upper part of target shot away.

† No cartridge case used.

** As furnished, worked out on some formula at Elswick, giving unusually low results, nearly representing perforation through steel.

‡ Worked out by author on Krupp's formula.

On board the *Royal Arthur* sixteen rounds were fired from a 6-inch quick-firing gun in three minutes at prize firing. The ship was steaming about 8 knots. Range commenced at 1600 yards. Ended at 2200 yards. Target struck nine times. In the *Royal Sovereign*, practice almost equally good was obtained; indeed, the worst gun's crew fired nine rounds in the time.

CANET QUICK-FIRE GUNS.*

	Quick-Fire Guns of 45, 60, and 80 Calibres.																	
Calibre, in centimètres	5·7	6·5	6·5	7·5	9·0	9·0	10·0	10·0	10·0	12·0	12·0	12·0	14·0	14·0	15·0	15·0	16·0	16·0
Calibre, in inches	2·24	2·57	2·57	3·03	3·90	3·90	3·94	3·94	3·94	4·72	4·72	4·72	5·51	5·51	5·91	5·91	6·30	6·30
Total length, in feet	15·0	12·8	17·1	14·8	17·7	23·6	14·8	19·7	26·3	17·7	23·6	31·5	20·7	27·6	22·2	29·5	23·6	31·5
Total length, in calibres	80	60	80	60	60	80	45	60	80	45	60	80	45	60	45	60	45	60
Weight of Piece, in tons	0·79	0·81	0·94	1·23	2·17	2·51	1·67	2·95	4·18	2·85	5·12	6·00	4·58	8·10	5·61	9·94	6·84	12·10
Weight of Steel Projectile, lbs.	6·61	8·82	8·82	13·23	22·05	22·05	28·66	28·66	28·66	46·30	46·30	46·30	70·55	70·55	88·19	88·19	110·2	110·2
Muzzle Velocity, in foot-secs.	3150	2723	3182	2760	2789	3281	2428	2789	3281	2461	2822	3281	2461	2822	2461	2822	2461	2822
Velocity at 2500 mètres, in foot-secs.	1404	1243	1476	1388	1535	1811	1378	1578	1857	1486	1707	1982	1568	1798	1624	1867	1690	1932
Energy at Muzzle, foot-tons	454·9	453·3	619·3	695·0	1421	1841	1172	1536	2140	1944	2555	3456	2952	3895	3703	4869	4632	6086
Energy at 2500 mètres, foot-tons	90·4	94·6	133·4	176·6	360·4	501·4	375·9	495·7	685·5	709·1	934·5	1261	1203	1582	1613	2131	2183	2843
Perforation through wrought iron at Muzzle — By French formula, ins.	11·4	10·0	12·4	11·4	13·7	18·2	12·2	15·1	19·7	14·8	18·4	23·2	17·2	21·2	18·5	23·2	22·2	25·2
Perforation through wrought iron at Muzzle — By English formula, ins.	8·4	7·9	9·1	9·0	10·3	12·2	10·2	11·7	13·8	12·0	13·8	16·0	13·7	15·7	13·4	17·0	16 0	18·4
Perforation at 2500 mètres — By French formula, ins.	3·3	3·0	3.7	4·0	5·6	7·3	5·1	6·3	8·2	7·0	8·5	10·7	8·6	10·6	9·8	12 3	11·4	14·5
Perforation at 2500 mètres — By English formula, ins.	..	..	..	..	..	..	5·6	..	..	..	..	..	..	..	9·6	..	10·9	..

Note.—The Canet 15-cm. and 12-cm. guns fire respectively 12 and 10 rounds per minute.

* The figures in this Table have been obtained from Canet, except that they are here converted into English measures.

KRUPP QUICK-FIRE GUNS.*

	Quick-Fire Guns of 35 and 40 Calibres in length.																							
Calibre, in centimètres .	4	4·7	5	5·3	5·7	6	7	7·5	8	8·4	8·7	9	10·5	10·5	12	12	13	13	14	14	15	15	16	16
Calibre, in inches . .	1·57	1·85	1·97	2·09	2·24	2·36	2·76	2·95	3·15	3·31	3·43	3·54	4·13	4·13	4·72	4·72	5·12	5·12	5·51	5·51	5·87	5·87	6·30	6·30
Total length, in feet. .	5·25	6·17	6·23	6·96	7·48	7·87	9·19	9·84	10·50	11·08	11·42	11·81	12·07	13·78	13·78	15·75	14·93	17·06	16·08	18·37	17·13	19·55	18·37	21·00
Length of Bore, in inches .	57·1	68·9	73·2	77·8	83·7	88·0	102·6	110·0	117·3	123·2	127·6	131·9	133·1	153·6	152·6	176·2	164·4	190·0	177·6	205·1	189·0	218·1	202·8	234·3
Length of Gun, in calibres	40	40	40	40	40	40	40	40	40	40	40	40	35	40	35	40	35	40	35	40	35	40	35	40
Weight of Piece, in lbs. .	231·5	418·9	496·0	606·3	738·5	848·8	1344·8	1653·5	1984·2	2314·9	2535·3	2866·0	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Piece, in tons .	..	..	..	..	0·33	0·38	0·60	0·74	0·89	1·03	1·13	1·28	1·18	1·38	1·87	2·17	2·44	2·85	3·10	3·57	3·27	4·35	4·68	5·41
Weight of Steel Projectile, in lbs.	1·76	3·31	3·86	4·85	6·06	6·61	10·47	12·90	15·43	17·86	19·84	22·04	26·5 30·9 35·3	26·5 30·9 35·3	39·7 44·1 52·4	39·7 44·1 52·4	50·7 58·4 66·1	50·7 58·4 66·1	62·8 72·8 82·7	62·8 72·8 82·7	76·1 88·2 100·3	76·1 88·2 100·3	94·8 110·2 123·5	94·8 110·2 123·5
Weight of Charge, in lbs. .	0·34	0·63	0·79	0·90	1·06	1·19	2·09	2·58	2·87	3·42	3·64	3·97	5·29	5·29	7·72	7·72	10·03	10·03	12·57	12·57	15·43	15·43	18·74	18·74
Muzzle Velocity, in ft.-secs.	2231	2231	2231	2231	2231	2231	2231	2231	2231	2231	2231	2231	2329 2165 2034	2461 2297 2133	2329 2165 2034	2461 2297 2133	2329 2165 2034	2461 2297 2133	2329 2165 2034	2461 2297 2133	2329 2165 2034	2461 2297 2133	2329 2165 2034	2461 2297 2133
Muzzle Energy, in foot-tons	61	114	133	167	209	228	361	445	535	601	683	777	1013†	1114†	1503†	1653†	1895†	2085†	2372†	2609†	2876†	3163†	3542†	3895†
Calculated perforation through wrought iron — German‡	..	..	..	..	..	..	..	..	..	..	..	..	9·3†	9·9†	10·4†	11·4†	11·6†	12·4†	12·6†	13·4†	13·5†	14·4†	14·5†	15·5†
Calculated perforation through wrought iron — English	3·7	4·6	4·9	5·3	5·7	5·8	6·8	7·3	7·7	8·0	8·4	8·8	9·3†	9·7†	10·6†	11·1†	11·4†	11·9†	12·3†	12·9†	13·1†	13·7†	14·0†	14·7†

* The figures in this Table have been obtained from Krupp, except that they are here converted into English measures.

† These Energies and Perforations are for the heaviest projectile of the three given above, and therefore for the lowest velocity as calculated on the English system, and also presumably on the German system.

‡ This is obtained by adding 25 per cent. to the perforations through steel given in Krupp's Tables. The Krupp 16-cm. gun fires 8 rounds per minute; the 15-cm. gun 9 to 10, and the 12-cm. gun 10 rounds per minute.

Table Relating to Conversion of Measures.

Length.

Metric to English. | English to Metric.

I. Mètres.	II. Yards.	III. Feet.	IV. Inches.	V. Yards.	VI. Mètres.	VII. Feet.	VIII. Mètres.	IX. Inches.	X. Centimètres.
1	1·0936	3·2809	39·37	1	0·91438	1	0·30479	1	2·5400
2	2·1873	6·5618	78·74	2	1·82877	2	0·60959	2	5·0799
3	3·2809	9·8427	118·11	3	2·74315	3	0·91438	3	7·6199
4	4·3745	13·1236	157·48	4	3·65753	4	1·21918	4	10·1598
5	5·4682	16·4045	196·85	5	4·57192	5	1·52397	5	12·6998
6	6·5618	19·6854	236·22	6	5·48630	6	1·82877	6	15·2397
7	7·6554	22·9663	275·60	7	6·40068	7	2·13356	7	17·7797
8	8·7491	26·2472	314·97	8	7·31507	8	2·43836	8	20·3196
9	9·8427	29·5281	354·34	9	8·22945	9	2·74315	9	22·8596

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of yards in 2354 mètres (see cols. I. & II.).	of feet in 12·4 mètres (see cols. I. & III.).	of inches in 30·5 centimètres (see cols. I. & IV.).	of mètres in 1026 yards (see cols. V. & VI.).	of mètres in 1742 feet (see cols. VII. & VIII.).	of centimètres in 17·72 ins. (see cols. IX. & X.)
mètres. yards. 2000=2187·3 300= 328·09 50= 54·68 4= 4·37 ∴ 2354=2574·44	mètres. feet. 10 =32·809 2 = 6·562 0·4= 1·312 ∴ 12·4=40·683	Note, 1 m.=100 cm. cms. inches. 30·0=11·811 ·5= ·197 ∴ 30·5=12·008	yards. mètres. 1000=914·38 20= 18·29 6= 5·49 ∴ 1026=938·16	feet. mètres. 1000=304·79 700=213·36 40= 12·19 2= 0·61 ∴ 1742=530·95	inches. cms. 10·0 =25·400 7·0 =17·780 0·7 = 1·778 ·02= ·051 ∴ 17·72=45·009

Note.—A ready way of approximately converting all French measures into English inches is to multiply by 4 and apply the decimal point by common sense—Thus for a 15-cm. gun; 15 × 4 = 60. Now this Calibre cannot be 60 inches, nor can it be 0·6 inch; therefore it must be 6 inches. (The exact value is 5·906 in.)

Weight.

Metric to English. | English to Metric.

I. Kilogrammes.	II. Tons.	III. Pounds Avoirdupois.	IV. Grains Troy.	V. Tons.	VI. Milliers.	VII. Pounds Avoirdupois.	VIII. Kilogrammes.	IX. Grains. Troy.	X. Gramme.
1	·000984	2·2046	15432·3	1	1·016	1	0·4536	1	·0648
2	·001968	4·4092	30864·7	2	2·032	2	0·9072	2	·1296
3	·002953	6·6139	46297·0	3	3·048	3	1·3608	3	·1944
4	·003937	8·8185	61729·4	4	4·064	4	1·8144	4	·2592
5	·004921	11·0231	77161·7	5	5·080	5	2·2680	5	·3240
6	·005905	13·2277	92594·1	6	6·096	6	2·7216	6	·3888
7	·006889	15·4323	108026·4	7	7·112	7	3·1751	7	·4536
8	·007874	17·6370	123458·8	8	8·128	8	3·6287	8	·5184
9	·008858	19·8416	138891·1	9	9·144	9	4·0823	9	·5832

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of tons in 35 milliers (see cols. I. & II. Note, 1000 kg. =1 millier).	of pounds in 56·3 kilogrammes. (see cols. I. & III.).	of grains in 120 grammes (see cols. I. & IV. Note, 1000 grms. = 1 kg.)	of milliers in 38 tons (see cols. V. & VI.).	of kilogrammes in 68 pounds (see cols. VII. & VIII).	of grammes in 85 grains (see cols. IX. & X.).
milliers. tons. 30 = 29·53 5 = 4·92 ∴ 35 = 34·45	kgrms. lbs. 50 =110·231 6 = 13·228 0·3= ·661 ∴ 56·3=124·120	grammes. grains. 100=1543·23 20= 308·65 ∴ 120=1851·88	tons. milliers. 30 = 30·48 8 = 8·13 ∴ 38 = 38·61	lbs. kgs. 60 = 27·216 8 = 3·629 ∴ 68 = 30·845	grains. grammes. 80 = 5·184 5 = 0·324 ∴ 85 = 5·508

Note.—7000 grains troy=1 pound avoirdupois.

PRESSURE.

Metric to English.			English to Metric.				Atmospheric to English.		English to Atmospheric.	
I. Kilogrammes per square centimètre.	II. Pounds per square inch.	III. Tons per square inch.	IV. Pounds per square inch.	V. Kilogrammes per square centimètre.	VI. Tons per square inch.	VII. Kilogrammes per square centimètre.	VIII. Atmospheres.	IX. Tons per square inch.	X. Tons per square inch.	XI. Atmospheres.
1	14·223	·00635	1	·07031	1	157·49	1	·00656	1	152·38
2	28·446	·01270	2	·14062	2	314·99	2	·01313	2	304·76
3	42·668	·01905	3	·21093	3	472·48	3	·01969	3	457·14
4	56·891	·02540	4	·28124	4	629·97	4	·02625	4	609·52
5	71·114	·03175	5	·35155	5	787·47	5	·03281	5	761·91
6	85·337	·03810	6	·42186	6	944·96	6	·03938	6	914·29
7	99·560	·04445	7	·49217	7	1102·45	7	·04594	7	1066·67
8	113·783	·05080	8	·56248	8	1259·95	8	·05250	8	1219·05
9	128·005	·05715	9	·63279	9	1417·44	9	·05906	9	1371·43

Note.—One atmosphere is taken to be 14·7 lbs. per square inch.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of pounds per square inch in 32·1 kilogrammes per square centimètre (see cols. I. & II.).

kgs. per sq. cm.	lbs. per sq. in.
30 =	426·68
2 =	28·45
0·1 =	1·42
∴ 32·1 =	456·55

of tons per square inch in 3210 kilogrammes per square centimètre (see cols. I. & III.).

kgs. per sq. cm.	tons per sq. in.
3000 =	19·05
200 =	1·27
10 =	·06
∴ 3210 =	20·38

of kilogrammes per square centimètre in 15 lbs. per square inch (see cols. IV. & V.).

lbs. per sq. in.	kgs. per sq. cm.
10 =	·7031
5 =	·3516
∴ 15 =	1·0547

of kilogrammes per square centimètre in 18·3 tons per square inch (see cols. VI. & VII.).

tons per sq. in.	kgs. per sq. cm.
10 =	1574·9
8 =	1259·95
0·3 =	47·25
∴ 18·3 =	2882·10

of tons per square inch in 3254 atmospheres. (see cols. VIII. & IX.).

atmospheres.	tons per sq. inch.
3000 =	19·69
200 =	1·31
50 =	·33
4 =	·03
∴ 3254 =	21·36

of atmospheres in 14·6 tons per square inch (see cols. X. & XI.).

tons per sq. in.	atmospheres.
10 =	1523·8
4 =	609·5
0·6 =	91·4
∴ 14·6 =	2224·7

ENERGY.

Metric to English.		English to Metric.	
I. Mètre-tons.	II. Foot-tons.	III. Foot-tons.	IV. Mètre-tons.
1	3·2291	1	0·3097
2	6·4581	2	0·6194
3	9·6872	3	0·9291
4	12·9162	4	1·2388
5	16·1453	5	1·5484
6	19·3743	6	1·8581
7	22·6034	7	2·1678
8	25·8324	8	2·4775
9	29·0615	9	2·7872

1 mètre-ton is termed a "dinamode" in Italy.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus find the number

of foot-tons in 4367 mètre-tons (see cols. I. & II.).

mètre-tons.	foot-tons.
4000 =	12916·2
300 =	968·72
60 =	193·74
7 =	22·60
∴ 4367 =	14101·26

of mètre-tons in 3592 foot-tons (see cols. III. & IV.).

foot-tons.	mètre-tons.
3000 =	929·1
500 =	154·84
90 =	27·87
2 =	·62
∴ 3592 =	1112·43

PERFORATION THROUGH IRON AND STEEL WITH THE FACE NOT HARDENED.

To obtain perforation through steel equivalent to a given perforation through iron, and *vice versâ*.

1 inch steel = $1\frac{1}{4}$ inches iron ;

that is, 4 inches steel = 5 inches iron.

Thus, given 9·4 inches perforation through iron,

$$9{\cdot}4 \times \frac{4}{5} = 7{\cdot}52 \text{ inches steel;}$$

or, given 5·2 inches steel,

$$5{\cdot}2 \times \frac{5}{4} = 6{\cdot}5 \text{ inches iron.}$$

PART IV.

STATISTICS, OFFICIAL STATEMENTS AND PAPERS.

Statement of the First Lord of the Admiralty explanatory of the Navy Estimates for 1894–95.

The Navy Estimates for 1894–95 amount to a net total of £17,366,100, or £3,126,000 more than the sum voted for 1893–94. This large increase is due chiefly to shipbuilding, armaments, manning, victualling, new works, and Royal Naval Reserves.

In 1893–94 the net estimate of the numbers of officers, seamen, boys, coastguard, and Royal Marines was 76,700. A force of 83,400 is proposed for 1894–95, being an increase of 6700. Part of this increase (about 1600) is automatic, and arises as the boys from the training ships (3700 of whom are entered annually) are drafted into the Service. **Personnel.**

We propose to enter 800 seamen direct from the Mercantile Marine and other sources in order to meet present wants, and to meet the objections, in case of war, of having to fall back on too large a number of our Reserves. The proportion which the number of men on the permanent list should bear to the number of Reserve men available has been carefully settled, and it is in order to secure the proper number of more experienced men that we make the present proposals.

It is essential to the efficiency of the Fleet that the number of the engine-room artificers should be increased, and it is proposed to add 350 to the numbers of this class. The increase desired in the number of stokers amounts to 2,450. During the present financial year we shall have entered the full number provided for in the estimates of 1893–94. The men seem likely to be an extremely satisfactory and valuable addition to the crews of our ships.

It is proposed to repeat the increase of 500 made last year in the Royal Marines, which will bring up the total to 15,500—a number necessary for the requirements of our present Fleet, and the efficiency of the Corps.

The number of ships in commission has not been largely increased. The Mediterranean Fleet has received an addition of two cruisers and a torpedo gunboat.

The increased number of first-class battleships and large cruisers now maintained in commission afloat leads to greater demands than previously upon our supply of seamen, while for ships in the Fleet Reserve skeleton crews are needed to render them ready for service within a few hours of mobilisation. This altered but important condition of service involves the necessity of having a larger number of men of various classes immediately available. The new torpedo-boat destroyers now being built will also involve a considerable increase, particularly in the engine-room ratings.

New Construction.

Shipbuilding under Naval Defence Act, 1893–94.

The progress made in the advancement and completion of ships building under the Naval Defence Act has fully realised the anticipations of my Statement last year. Of the ten first-class battleships seven will be in commission, and the Royal Oak, Repulse, and Revenge will be ready for service in April, 1894. Of the 42 cruisers, only five of the Astræa or second class, which are far advanced, will remain unfinished. Ten will be in commission. Of torpedo gunboats of the Halcyon class, three or four only remain to be completed.

It is estimated that most of the vessels not yet finished will be ready and available for service early in the next financial year. In one or two cases, to secure continuity of employment for the workmen in the dockyards, there will be a longer period given for completion. The estimated expenditure to complete the ships built under the Naval Defence Act will be about £292,000.

In order to complete so many battleships and cruisers within a limited period, great exertions have had to be made, but the difficulties involved have been overcome by the energy and ability of those employed in the Royal Dockyards, particularly at Portsmouth.

Other Shipbuilding in 1893–94.

Battleships.

The battleship Renown, laid down at Pembroke in 1892–93, has been considerably advanced.

The first-class battleships Majestic and Magnificent were begun during 1893–4 at Portsmouth and Chatham respectively. Owing to the expediency of postponing their commencement until all the circumstances connected with the loss of the Victoria had been thoroughly considered by the Admiralty, definite orders to commence the construction of these two vessels were not given to the dockyards until late in 1893; it became, therefore, impossible to expend upon

them during the financial year the full amounts for labour which had been inserted in the programme. Both vessels are, however, now being rapidly advanced.

The first-class cruisers, Powerful and Terrible, were commenced by contract at the Naval Construction Co.'s works at Barrow, and at Messrs. Thompson's works on the Clyde. The preparation of the design of these vessels has involved many new problems in regard to armament, protection and propelling machinery. They have been solved in a manner which increases the fighting efficiency of these ships; but, owing to the time necessarily taken to decide these preliminaries, it was not possible to give orders for either ship until a later period in the financial year than had been hoped. The orders were given at the end of December, and the work of construction is now being pushed forward. Cruisers, &c.

Three second-class cruisers, the Eclipse, Minerva, and Talbot (sister ships), were laid down at Portsmouth, Chatham, and Devonport respectively, and a larger sum was allotted for expenditure on these vessels when it was perceived that there must be unavoidable delay in commencing the battleships.

Two sloops, the Torch and Alert, were also begun during the year at Sheerness.

The principal particulars of the designs of the Talbot class and of the sloops were given in the Appendix to the Estimates for 1893–94. Corresponding information relating to the Majestic and Magnificent and the first-class cruisers Powerful and Terrible was given in papers presented to Parliament in August, 1893.

In a few particulars the dimensions given in these Parliamentary papers have been slightly modified in the completed designs. The actual dimensions appear in the Appendix to the Navy Estimates for 1894–95.

The development of this important class of vessel has received special attention during the year, and statements have been given to Parliament of the action taken by the Admiralty. The original intentions have been greatly exceeded. The first vessel of the class completed, the Havock, built by Messrs. Yarrow, has been tried with very satisfactory results. The vessels first begun by Messrs. Thornycroft and Messrs. Laird are now making their preliminary steam trials. Forty-two vessels of this class have been ordered by contract, of which six will be completed by March 31st. Leading firms of builders on the Thames, Clyde, Tyne, Wear, Mersey, at Hull, Barrow-in-Furness, and Cowes, are occupied in building these vessels. It has been made a condition in these contracts that the vessels shall be completed in the coming financial year. Torpedo-boat destroyers.

New Programme, 1894–5.

In the coming financial year it is proposed to commence seven battleships of the first-class, six cruisers of the second-class, and two sloops.

Battle-ships. The main features of the new battleships will follow generally the designs of the Majestic and Magnificent. It is proposed to build five of the battleships in dockyards, two at Portsmouth, two at Chatham, and one at Pembroke. On the first of the vessels to be built at Portsmouth and Chatham and on the battleship at Pembroke it is proposed to make substantial progress during the year; on the second vessels to be built at Portsmouth and Chatham it is proposed to incur only a moderate expenditure, sufficient to open out the work, so that in the following year the vessels may be rapidly advanced. Two of the battleships will be built by contract.

Cruisers, &c. The six second-class cruisers will be of the Talbot type, and will be built by contract. It is proposed to build at Devonport two twin-screw sloops. These vessels are specially adapted for service on the China station, and will take the place of gunboats like the Swift and Linnet. Their machinery and boilers will be made at Devonport.

Summary. It will thus be seen that independently of the vessels completing under the Naval Defence Act, and of six torpedo-boat destroyers which are almost or quite complete, we shall have building:—

In the Dockyards—
- Eight first-class battleships.
- Three second-class cruisers.
- Four sloops.

In private yards—
- Two first-class battleships.
- Two first-class cruisers.
- Six second-class cruisers.
- Thirty-six torpedo-boat destroyers.

The new scheme of construction for 1894–95 forms part of a complete programme which has been arranged for a term of five years. This programme has been settled after a careful review, not only of the present relative strength of our Navy as compared with that of other Powers, but also of the number and class of ships of war which are now being built abroad.

The distribution of the shipbuilding work contemplated has been made to suit the convenience of building in dockyards and by private firms, and embraces various types of cruisers as well as battleships. As battleships require longer periods for construction

than cruisers, they must be laid down in the earlier years, while cruisers of various types will be built in the later years of the period covered by the programme.

Reconstruction and Repairs.

The repair and refit of the Warspite, Agincourt, Rambler, Cruiser, and Pylades will have been completed, and that of the Northumberland will be far advanced by the end of the year.

The repair of the Howe is a remarkable work, both on account of the difficulty connected with it, and the rapidity with which it was carried out, and reflects great credit on all those who were concerned in it. The Howe grounded off Ferrol on November 2nd, 1892. A Swedish salvage firm contracted to save her, and after overcoming extraordinary difficulties they succeeded in floating her on March 30th, 1893. She was then docked at Ferrol, where the Spanish authorities gave the readiest assistance to the Admiral, officers, and dockyard officials in charge of her. She was at once temporarily repaired, and safely reached the Nore on the 22nd and Chatham on June 26th. The serious damages which she had sustained were energetically taken in hand there, and in four months, at a cost of £45,000, she was repaired, and was re-commissioned on October 31st, and is now one of the Mediterranean Fleet. Howe.

The repair of the Dreadnought, Impérieuse, Phaeton, Cordelia, and Comus will be commenced and completed in 1894–95, and that of the Warrior, Conquest, and Carysfort advanced during the year.

Dockyard Administration.

During last year important modifications have been made in the pay of workmen employed in the dockyards. Certain changes made in 1891 had caused dissatisfaction, the causes of which demanded careful investigation. Inquiries were conducted at the yards by the Financial Secretary and the Civil Lord, and were followed by the consideration of the more important questions by a Departmental Committee. The final decisions of the Admiralty have been embodied in two returns, which have been laid before the House of Commons, and the second of which will shortly be published. These returns show the various changes made, which include the raising of the wages of unskilled labourers and of various other trades, and the abolition of the system of "classification" in the case of shipwrights and five other trades for whom it had been introduced in 1891. Wages.

Boilers and Machinery.

During the year 1893–94 a large number of ships have passed satisfactorily through their contract steam trials. They included eight battleships, six first-class cruisers, three second-class cruisers, eight torpedo gunboats, and the torpedo-boat destroyer Havock.

The Devastation has been re-engined and fitted with boilers of the common combustion chamber type. The tubes being fitted with the Admiralty cap ferrules enabled the trials to be accomplished satisfactorily. The fitting of these ferrules has been extended in the boilers of H.M. ships with satisfactory results.

In connection with the propelling apparatus of the Powerful and Terrible it became necessary to decide whether, in view of the very high sea-speed for which the vessels are designed, and the great power required for the attainment of that speed, a new departure should not be made, and boilers on the "water-tube" principle adopted. After full inquiry into the experience gained in recent years with water-tube boilers fitted in sea-going ships, it was decided to adopt a type which has proved successful on a large scale and over long voyages. These boilers will be made in this country, and the orders for the machinery have been placed with two of the most eminent private firms, whose competency for the task they have undertaken is undoubted.

The Speedy is the first ship in the Navy fitted with a group of water-tube boilers. They are of the Thornycroft type, and the engines are also by Messrs. Thornycroft & Co. They realised over 4700 indicated horse-power, the contract being 4500.

Water-tube boilers, of English design and manufacture, have been or are being fitted in a number of torpedo-boat destroyers now in course of construction, and those that have been tested have given most promising results. The torpedo-boat destroyer Hornet, engined by Messrs. Yarrow & Co., is fitted with a set of the Yarrow patent water-tube boilers, and her preliminary trials have given very promising results, her speed having exceeded that of the sister vessel the Havock, the first of her class which is fitted with locomotive boilers.

Armour-plate Experiments.

The past year has been remarkable for the results obtained from experiments conducted with steel armour treated by the "Harvey" process. Armour-plates supplied by four firms have been tested, by

and for the Admiralty. The investigation has been most thorough and extensive, and, as a result, orders have been given for Harveyed steel armour for the Renown, Majestic, and Magnificent. In the course of the experiments the use of nickel as an alloy of steel for the purposes of armour-plates has been fully tested. It has been established that Harveyed plates without nickel in the steel show resistance to modern projectiles as great as any hitherto obtained when nickel was combined with steel in plates also treated by the Harvey process. The consequence of adopting this new system will be a great saving in cost for a given defence. By means of these improvements the power of defence obtainable with certain thicknesses and weights of armour has been very greatly increased, and this circumstance must considerably affect the designs of battleships to be laid down in the future.

Naval Ordnance.

The progress of gun manufacture has been very satisfactory this year, and the guns are ready for all the ships arming or about to be armed under the Naval Defence Act; 298 guns have been completed, varying from 16·25-inch to 4·7-inch, the greater number being of the 6-inch quick-firing type, of which 169 are ready, and most of them mounted.

The gunnery trials of the Centurion, with a new description of high-angle fire mountings fitted with complete hand-worked arrangements, were recently carried out, and were very satisfactory. In her sister ship, the Barfleur, electricity will be tried for the first time for facilitating the working of the guns.

The first of the new 12-inch steel and wire guns alluded to in my Statement for 1893–94 has been completed and proved; it has fully realised the expectations of its designers (the Royal Gun Factory, Woolwich), and it is now with the Ordnance Committee for experiment to ascertain the best form of chamber and rifling to be used with cordite. Five more of these guns are in an advanced stage of construction.

The new 4-inch quick-firing gun has been completed, and it has been very favourably reported on by the Ordnance Committee, and the design is now sealed for future manufacture. The same may be said of the 12-pounder quick-firing ship gun, of which a large number have been ordered for the torpedo-boat destroyers.

Cordite has been approved and adopted as a Service store, and for the quick-firing guns of 6 inches and below may no longer be considered as experimental. For guns of this class it is being issued

as fast as manufactured. For the heavier guns it is still under experiment.

The re-arming of the Fleet with the magazine rifle will commence during the financial year 1894–95.

New Works, &c.

Of the large works in progress, the construction of the two new docks at Portsmouth is proceeding by contract, and is well advanced.

The extension of the Admiralty mole at Gibraltar was commenced last year, and this portion of the work, when completed, will increase the length of the mole to 2100 feet.

At Portland harbour the new coaling station will be finished in 1894–95, as well as works which were undertaken subsequently to the preparation of the estimates of 1893–94 for protecting the eastern side of the harbour.

The Naval Depôt which the New South Wales Government is constructing on Garden Island, Sydney, for the Admiralty, in exchange for the depôt on the mainland, is expected to be completed and handed over next year.

For 1894–95 it is proposed to obtain the sanction of Parliament to the commencement of several large works, which not only increase the year's estimates by £270,000 over the estimates of 1893–94, but will involve heavy future liabilities.

The increase of our ships in size and number necessitates an increase of dock accommodation, and the development of modern naval warfare makes it necessary to find additional anchorage for our fleets, where they will not be exposed to the danger of torpedo attack. With this in view, works have been begun, and are advanced, for protecting Portsmouth and Portland harbours, and preparations are being made for similar works at Devonport and Southampton Water.

The necessity for protection from torpedo attack and for increasing the facilities for coaling our men-of-war, have made the Admiralty propose the further elongation of the mole at Gibraltar, which, when completed, will be 3700 feet in length. It is proposed to commence at once a graving dock at Gibraltar; this work has long been considered necessary for our Mediterranean Fleet and the Channel Squadron, which frequently goes to Gibraltar.

For the speedy mobilisation of the Fleet it is most desirable to increase the basin accommodation at Keyham, and to have greater facilities for coaling. It is also indispensable to have in the same

port more docks. At the present time only one first-class battleship can be docked there, and the entrance to that dock is extremely inconvenient at certain times. To effect these objects provision has been made in the Estimates for a basin area of 41 acres, for three new docks and a coaling jetty.

It is proposed to deepen, by dredging, the harbours of Portsmouth and Devonport, and to widen the channel of the river Medway, so that sufficient depth of water may be obtained for mooring ships, and for facilitating their passage to and from the important dockyard of Chatham.

The inconvenience of putting seamen in hulks, when not on board commissioned ships, has been dealt with at Keyham, where, some years ago, a barrack was erected. The same arrangement has been made for the men training in the Excellent at Portsmouth. Admirable results upon the health, conduct, and comfort of the men have followed the adoption of this system, and it is most desirable to extend it. The need is now most pressing at Chatham, and it is proposed to commence the building of a naval barrack for 3500 officers and men at that place. When this building is completed the hulks, which now occupy valuable space in the basins, will be removed.

The increase in the Royal Marines has made it difficult to carry out thoroughly at Walmer the training of all recruits, which has hitherto been extremely successful; it is proposed to extend these barracks so as to give accommodation for the training of 2000 recruits annually.

The extension of the Engineer Students' College at Keyham is most necessary, as the present accommodation is insufficient for the number of these important officers, who are trained in this institution for the Navy.

Important works are also contemplated for the storage of ammunition at Gibraltar and Malta.

MOBILISATION.

The united crews of the ships, &c., specially put in commission for the partial mobilisation of 1893 amounted to 9425, as compared with 8937 in 1892. In the course of the year the number of signal ratings had largely increased, so that instead of there being any deficiencies in the signal department when the partial mobilisation was effected, 84 surplus signal ratings were distributed amongst the several manœuvre fleets and squadrons.

During the year preparations have been made for definitely appropriating petty officers and men of all ratings to the three home ports, in order that each port may be self-supporting and capable of manning and providing for the care and maintenance of all ships attached to it. A complete establishment for each port has been drawn up, and the numbers voted have been divided between them in proportion to their requirements. New entries from the shore, and boys on completion of their training, will be appropriated to a port, according to the numbers required to complete the respective port establishments. It is hoped that the establishment of these port divisions will eventually provide for the actual needs of each port, facilitate mobilisation, and enable recruiting to be placed on a continuous and satisfactory system.

The changes in the constitution of the coastguard and port guard ships previously instituted have been further developed during the past year. The coastguard ships now consist for the most part of fast cruisers of modern type, while the old type vessels previously stationed at the naval ports have been replaced by second-class battleships, and at Queenstown by an armoured cruiser. It has also been decided to replace the present old type gunboats attached as tenders to the coastguard ships by torpedo gunboats of high speed, and this is now being done.

Royal Marines.

The increase of numbers voted to the establishment in April, 1893, added to the ordinary waste, rendered it necessary to recruit about 2000 men. Without reducing the standard of height, 1964 recruits have been obtained since April 1st, 1893. To meet the increased competition for the best men it is proposed to hold out some additional inducements to men to join the Royal Marines. Provision has been made in the Estimates for extra payment to men of the corps while acting as non-commissioned officers, as well as allowances for the gratuitous issue of certain additional articles of clothing.

Swimming baths. Hitherto it has been possible to impart instruction in swimming to recruits from the open beach to only comparatively few of the men, the number trained depending more or less on the length of the summer season, but the new swimming baths now erected at the training depôt at Walmer will enable instruction to be given daily, and it is hoped that this essential art will be acquired by every Marine before he proceeds to sea.

During the summer a battalion of Marines was associated with the troops of the various arms of the Service at Aldershot, and the experience gained will be of considerable value. It is intended to attach a similar battalion of Royal Marines to Aldershot annually.

It is proposed to add 500 men to the corps during the year 1894–95.

Royal Naval Reserve.

The number of officers who have made themselves efficient by varying periods of service in the Fleet is 248, as compared with 192 at the end of last year. The lists are now practically full, and for that reason as many as 151 candidates have been refused during the past year. It is, however, proposed to increase the lieutenants and sub-lieutenants' list by 50 each, which will enable some of the most eligible of these candidates to be admitted. The number of officers to be entered for twelve months' training on board ships of the Fleet has been raised from 50 to 70. Provision has also been made for giving six months' training to 700 men of the R.N.R. in ships of the Fleet.

The first and second class Reserve men are nearly up to the full numbers voted, and the class of firemen, attracted by the new regulations, which were referred to in my Statement of last year, have presented themselves so readily for entry that it has been necessary to check temporarily their enrolment; but it is proposed to make provision in the Estimates for an addition of 400 to the list, which will bring the total number up to 1600.

It was not possible until February of this year to bring into force the New Regulations for embarking second-class men in the coastguard ships for sixteen working days' training, but the scheme is now in operation, and the distant centres of Stornoway and Lerwick, where there are a very large number of men of the second class, have been visited by H.M.S. Superb and Galatea, respectively, for the purpose of embarking this class of the Reserve. The other coastguard ships will receive the men at their headquarters.

A marked advantage has been gained by the Gunnery lieutenants of the coastguard ships visiting the R.N.R. batteries to afford a few days' instruction, and most satisfactory reports are received of the efficiency of the men and their fitness to take their place as part of the crew of a man-of-war.

There is every cause for satisfaction at the condition of the force, both as regards officers and men.

Greenwich Hospital.

In accordance with the recommendation of the Select Committee of the House of Commons in 1892, the grant of £16,000 per annum formerly paid out of the Consolidated Fund in aid of the funds of Greenwich Hospital has been restored as from the 1st October, 1893, for the benefit of men who entered the Service before the 29th June, 1878. This money has been applied to increasing by 2000 the number of Age Pensions awarded to Naval and Marine pensioners of 55 years of age and upwards. The total number of Age Pensions existing at the present time is about 10,100. In accordance with another of the recommendations of the Committee, a rent of £5000 a year has been paid since 1st April, 1892, to Greenwich Hospital funds for the use, for the purposes of the Royal Naval College, of the Hospital buildings at Greenwich. By this means, funds for 600 additional Age Pensions have been provided.

In the case of the Victoria disaster every effort was made to provide promptly for the widows and children of the men who perished. The ship was lost on the 23rd of June, 1893, and by the 15th of August following the greater number of the cases had been investigated and the widows' pensions and the allowances to the children paid. In all, pensions have been awarded to 77 widows and allowances to 124 children of these seamen, while four cases from Malta, lately reported, are now under investigation. The charge thus entailed upon the funds of Greenwich Hospital amounts to nearly £1500 a year.

Naval Defence Act.

I stated last year that a Bill would be introduced for the purpose of amending the Naval Defence Act of 1889. This was done, and the Amending Act of 1893 was subsequently passed. The Act authorised the expenditure of a larger sum upon the ships built in the dockyards than was originally contemplated, and extended the time within which the vessels should be completed for sea. It also gave the Admiralty greater latitude with regard to the use of savings of previous years.

According to the latest information, the total expenditure upon the ships built in the dockyards will amount to £12,222,000, viz., £9,814,000 for hulls, &c., and £2,408,000 for armaments, or, in round numbers, an excess of £722,000 over the original estimate. It is anticipated that the whole of the expenditure on the ships

built by contract will be met out of the £10,000,000 charged under the Act to the Consolidated Fund.

We do not propose to extend to the new programme of shipbuilding financial machinery like that of the Naval Defence Act. Apart from financial policy and other considerations connected with it, the accounts rendered necessary by the Act have proved difficult and complicated in their working, and I trust that by careful and energetic management, the funds placed at the disposal of the Admiralty in the Annual Votes will secure the rapid and economical prosecution of shipbuilding work for the Navy.

SPENCER.

10*th March*, 1894.

Abstract of Navy Estimates for 1894–95.

Votes.		Estimates, 1894–95.			Estimates, 1893–94.			Difference on Net Estimates.		Votes.
		Gross Estimate.	Appropriations in Aid.	Net Estimate.	Gross Estimate.	Appropriations in Aid.	Net Estimate.	Increase.	Decrease.	
	I.—Numbers.			Total Numbers.			Total Numbers.	Numbers.	Numbers.	
A.	Total Number of Officers, Seamen, Boys, Coastguard, and Royal Marines	....	....	83,400	....	....	76,700	6,700	....	A.
	II.—Effective Services.	£	£	£	£	£	£	£	£	
1	Wages, &c., of Officers, Seamen and Boys, Coastguard, and Royal Marines	4,048,336	129,836	3,918,500	3,781,581	160,781	3,620,800	297,700	....	1
2	Victualling and Clothing for the Navy . . .	1,764,074	361,974	1,402,100	1,612,028	351,328	1,260,700	141,400	....	2
3	Medical Establishments and Services . . .	168,797	24,897	143,900	158,690	25,690	133,000	10,900	....	3
4	Martial Law	10,617	17	10,600	10,915	15	10,900	....	300	4
5	Educational Services	105,010	25,910	79,100	103,797	23,297	80,500	....	1,400	5
6	Scientific Services	71,177	9,577	61,600	70,593	11,293	59,300	2,300	....	6
7	Royal Naval Reserves	205,868	68	205,800	172,035	35	172,000	33,800	....	7
8	Shipbuilding, Repairs, Maintenance, &c.:									8
	Section I.—Personnel	1,797,835	26,035	1,771,800	1,826,706	29,706	1,797,000	....	25,200	Sec. I.
	Section II.—Matériel	2,529,000	235,000	2,294,000	1,893,000	237,000	1,656,000	638,000	....	Sec. II.
	Section III.—Contract Work	2,959,700	39,500	2,920,200	1,305,600	39,600	1,266,000	1,654,200	....	Sec. III.
9	Naval Armaments	1,433,200	50,000	1,383,200	1,365,200	50,000	1,315,200	68,000	....	9
10	Works, Buildings, and Repairs at Home and Abroad .	662,500	12,500	650,000	389,000	9,000	380,000	270,000	....	10
11	Miscellaneous Effective Services	183,625	9,825	173,800	169,365	9,265	160,100	13,700	....	11
12	Admiralty Office	239,720	8,520	231,200	239,520	8,520	231,000	200	....	12
	Total Effective Services . . . £	16,179,459	933,659	15,245,800	13,098,030	955,530	12,142,500	3,130,200	26,900	
	III.—Non-Effective Services.									
13	Half-Pay, Reserved, and Retired Pay. . . .	769,950	12,950	757,000	781,660	12,960	768,700	....	11,700	13
14	Naval and Marine Pensions, Gratuities, and Compassionate Allowances	1,013,871	23,471	990,400	979,924	23,524	956,400	34,000	....	14
15	Civil Pensions and Gratuities	313,133	533	312,600	312,760	560	312,200	400	....	15
	Total Non-Effective Services . . £	2,096,954	36,954	2,060,600	2,074,344	37,044	2,037,300	34,400	11,700	
	IV.—Extra Estimate for Services in connection with the Colonies.									
16	Additional Naval Force for Service in Australasian Waters—Annuity payable under	95,300	35,000	60,300	95,300	35,000	60,300	....	....	16
	Grand Total . . . . £	18,371,713	1,005,613	17,366,100	15,267,674	1,027,574	14,240,100	3,164,600	38,600	

Net Increase £3,126,000

STATEMENT showing the Actual and Estimated EXPENDITURE for NAVAL SERVICES for the Three Years ending the 31st March 1895.

		£	s.	d.
1892-93 .	Estimated Expenditure (after deducting Appropriations in Aid)	14,240,200	0	0
	Net Expenditure, as per Final Account . .	14,325,949	0	0
	Net (Expenditure more than Estimate) .	£85,749	0	0
1893-94 .	Estimated Expenditure (after deducting Appropriations in Aid)	£14,240,100	0	0
1894-95 .	Estimated Expenditure (after deducting Appropriations in Aid)	£17,366,100	0	0

STATEMENT of the Principal Points of DIFFERENCE between the ESTIMATES of 1893-94 and those for 1894-95.

INCREASES.		£
Wages, &c. of Officers, Seamen, and Marines		297,700
Victuals and Clothing		141,400
Medical Establishments and Services		10,900
Scientific Services		2,300
Royal Naval Reserves		33,800
Naval Stores		641,345
Machinery for Her Majesty's Ships (Contract)		668,244
Hulls of Ships (Contract)		842,280
Inspection of Contract Work		18,364
Gun Mountings and Air Compressing Machinery (Contract) . . .		102,712
Royal Reserve of Merchant Cruisers		12,000
Interest on Advances under Naval Defence Act, 1889		13,100
Wages of Artificers employed in Naval Ordnance Establishments . .		8,823
Torpedoes, Gun Cotton, Small Arms, and Miscellaneous		140,811
Works, Buildings, and Repairs		270,000
Passage Money		10,200
Non-Effective Services		22,700
Miscellaneous Items		5,100
		3,241,779
DECREASES.	£	
Martial Law	300	
Educational Services.	1,400	
Wages of Artificers in Dockyards	23,129	
Increase in amount of Receipts arising from the Sale of Old Ships and Unserviceable Naval Stores and Old Machinery (Net)	4,000	
Machinery for Shore Establishments	2,500	
Guns, Projectiles, and Ammunition	79,450	
Inspection and Proof of Naval Ordnance Stores	5,000	
		115,779
Net Increase . . . . . . £		3,126,000

STATEMENT showing the Total Estimated EXPENDITURE for the NAVAL SERVICE, including Amounts provided in the NAVY ESTIMATES, as well as in the CIVIL SERVICE and other ESTIMATES, for the following Services :—

———		1894–95.	1893–94.
NAVY ESTIMATES:		£	£
Estimated Expenditure (after deducting Appropriations in Aid)		17,366,100	14,240,100
CIVIL SERVICE ESTIMATES:			
Estimated Expenditure under—			
Class I. Vote 4.—Admiralty, Extension of Buildings (Net)		39,200	49,200
,, I. ,, 9.—Public Buildings, Great Britain:	£		
Maintenance and Repairs, including New Works, Alterations, &c.	2,950		
Rents, Insurance, Tithes, &c.	4,000		
Fuel, Light, Water, &c.	3,200		
Furniture	1,300		
		11,450	10,870
Class I. Vote 10.—Surveys of the United Kingdom		300	300
,, I. ,, 13.—Rates on Government Property		55,800	52,300
,, I. ,, 14.—Public Buildings, Ireland:			
Coast Guard, viz.:	£		
Purchase of Sites	—		
New Works and Alterations, including Naval Reserve Stations	8,000		
Maintenance and Supplies	6,033		
Furniture, Fittings, &c.	25		
	£14,058		
Naval Reserve, viz.:			
Maintenance and Supplies	171		
		14,229	13,595
Class II. Vote 8.—Board of Trade:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		3,325	3,325
Class II. Vote 14.—Exchequer and Audit Department (Cost of Audit):	£		
Navy Cash Accounts	7,058		
Expense and Manufacturing Accounts	5,416		
Store Accounts	4,515		
		16,989	15,666
Class II. Vote 23.—Stationery and Printing		65,000	58,000
,, III. ,, 1.—Law Charges, England (Net)		3,541	3,115
,, III. ,, 8.—Prisons, England and the Colonies:			
Maintenance of Naval Prisoners		1,538	1,355
,, III. ,, 14.—Prisons, Scotland		60	46
,, III. ,, 21.—Prisons, Ireland		52	60
REVENUE DEPARTMENTS:			
Post Office.—Postage of Official Correspondence (including Parcels)	£ 10,270		
,, Official Telegrams	4,300		
		14,570	13,900
Total . . . . £		17,592,154	14,461,832

VOTE (A.)

NUMBERS

Of all RANKS for whom Provision is made in the NAVY ESTIMATES, 1894–95.

I.—Available for Sea Service . . .	**76,591**	**83,400**
II.—Other Services	**6,809**	

Eighty-three Thousand Four Hundred.

I.—AVAILABLE FOR SEA SERVICE.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1894–95.		1893–94.		Average Numbers of all Ranks borne during the Year 1893.
	FOR HER MAJESTY'S FLEET (including Indian Troop Ships).					
Vote 1	Flag Officers	14		14		
Vote 1	Commissioned Officers . .	2,905		2,712		
Vote 1	Subordinate Officers . . .	572		597		
Vote 1	Warrant Officers . . .	1,006		1,004		
Vote 1	Petty Officers and Seamen . .	48,035		42,507		
Vote 1	Boys.	4,494	57,026	4,594	51,428	50,209
	COAST GUARD.					
Vote 1	Commissioned Officers . .	89		89		
Vote 1	Chief Officers of Stations . .	232		232		
Vote 1	Petty Officers and Seamen . .	3,879	4,200	3,879	4,200	4,084
	ROYAL MARINES (for Service Afloat and on Shore).					
Vote 1	Commissioned Officers . .	358		353		
Vote 1	Warrant Officers . . .	28		27		
Vote 1	Staff Sergeants and Sergeants .	955		927		
Vote 1	Buglers and Musicians . .	602		602		
Vote 1	Rank and File	13,422	15,365	12,956	14,865	14,473
	Total numbers available for Sea Service . . .		76,591		70,493	68,766

Net Increase in Numbers . . . 6,098

II.—OTHER SERVICES.

Under which Vote Provided.	RANKS, &c.	1894–95.		1893–94.		Average 1893.
Vote 1	Naval Cadets	270		248		
Vote 1	Engineer Students	158		155		
Vote 1	Pensioners in Home Ships and in the Reserves	1,213		1,177		
Vote 1	Boys under Training . . .	4,200	5,841	3,700	5,280	5,514
Other Votes	Various Services . . .	..	968	..	927	927
	Total numbers for other Services		(*a*)6,809		(*a*)6,207	6,441

Net Increase in Numbers . . . 602

	1894–95		1893–94
(*a*) Including Officers and Seamen	2,468	—	2,366
,, Boys	4,201	—	3,701
,, Royal Marines	140	—	140
	6,809	—	6,207

VOTE 8.

SHIPBUILDING, REPAIRS, MAINTENANCE, &c.

I.—ESTIMATE of the SUM which will be required, in the YEAR ending 31st March, 1895, to defray the EXPENSES of SHIPBUILDING, REPAIRS, MAINTENANCE, &c., including the COST of ESTABLISHMENTS of DOCKYARDS and NAVAL YARDS at HOME and ABROAD.

DOCKYARD WORK.

SECTION I.—PERSONNEL.—One Million Seven Hundred and Seventy-one Thousand Eight Hundred Pounds.
(£1,771,800.)

SECTION II.—MATÉRIEL.—Two Million Two Hundred and Ninety-four Thousand Pounds.
(£2,294,000.)

CONTRACT WORK.

SECTION III.—CONTRACT WORK.—Two Million Nine Hundred and Twenty Thousand Two Hundred Pounds.
(£2,920,200.)

II.—SUB-HEADS under which SECTION I., PERSONNEL, of this VOTE will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1894–95.	1893–94.		
	£	£	£	£
DOCKYARD WORK.				
SECTION I.—PERSONNEL.				
Dockyards at Home.				
A.—Salaries and Allowances	160,325*	161,945	..	1,620
B.—Wages, &c., of Men, and hire of Teams	1,370,202	1,396,045	..	25,843
C.—Wages, &c., of Police Force	38,142	38,305	..	163
D.—Contingencies	4,935	4,785	150	..
Naval Yards Abroad.				
E.—Salaries and Allowances	52,859*	52,827	32	..
F.—Wages, &c., of Men, and hire of Teams	159,529	160,235	..	706
G.—Wages, &c., of Police Force	10,913	11,634	..	721
H.—Contingencies	930	930	..	..
£	1,797,835	1,826,706	182	29,053
Deduct,— I.—Appropriations in Aid	26,035	29,706	..	3,671
£	1,771,800	1,797,000	182	25,382
	Net Decrease		. £25,200	

* These amounts include the sums of £13,798 and £1,271 for pay of Inspectors of Shipwrights at Home and Abroad respectively, which is charged direct to the cost of shipbuilding.

NOTE.—Provision has been made for New Construction in the above Vote to the extent of—

	Naval Defence Act, 1889.	Further Programme (including Small Craft).	Total.
Section 1	£159,720	£641,160	£800,880
„ 2	56,865	1,044,458	1,101,323
„ 3	64,348	2,533,449	2,597,797
	£280,933	£4,219,067	£4,500,000

In addition to the foregoing provision, a further sum of £11,210, savings in previous years, will, it is expected, be available for cash expenditure in 1894–95.

The details of the total anticipated Expenditure on New Construction will be found in the Recapitulation on page 444.

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION II., MATÉRIEL, of this VOTE will be accounted for.

———	ESTIMATES. 1894–95.	ESTIMATES. 1893–94.	Increase.	Decrease.
	£	£	£	£
DOCKYARD WORK—*continued.*				
SECTION II.—MATÉRIEL.				
Naval Stores.				
A.—Timber, Masts, Deals, &c. . .	155,000	136,800	18,200	..
B.—Metals and Metal Articles . .	1,115,270	547,205	568,065	..
C.—Coals for Yard purposes . . .	62,000	57,000	5,000	..
D.—Hemp, Canvas, &c.	135,000	105,000	30,000	..
E.—Paint Materials, Oils, Pitch, Tar, Tallow, Boats, Furniture, and other Miscellaneous Articles. . .	385,000	395,000	..	10,000
F.—Electrical, Torpedo, and other Apparatus	90,000	120,000	..	30,000
G.—Coals for Steam Vessels . . .	534,000	482,000	52,000	..
H.—Freight.	32,000	30,000	2,000	..
I.—Rents, Water, &c., Dockyards at Home, and Naval Yards Abroad . .	9,670	9,510	160	..
K.—Gas, &c., Dockyards at Home, and Naval Yards Abroad . . .	11,060	10,485	575	..
£	2,529,000	1,893,000	676,000	40,000
Deduct,—				
L.—Appropriations in Aid . . .	235,000	237,000	..	2,000
£	2,294,000	1,656,000	676,000	38,000
	Net Increase . . £638,000			

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION III., CONTRACT WORK, of this VOTE will be accounted for.

——	ESTIMATES.		Increase.	Decrease.
	1894–95.	1893–94.		
	£	£	£	£
SECTION III.—CONTRACT WORK.				
A.—Propelling Machinery for Her Majesty's Ships and Vessels	1,227,615	566,890	660,725	..
B.—Auxiliary Machinery for Her Majesty's Ships and Vessels	43,004	35,485	7,519	..
C.—Hulls of Ships, &c., Building by Contract	1,104,974	262,694	842,280	..
D.—Purchase of Ships, Vessels, &c.	..	..	..	..
E.—Repairs and Alterations by Contract of Ships, &c., and their Machinery and Stores	59,300	59,400	..	100
F.—Inspection of Contract Work	31,000	12,636	18,364	..
G.—Gun Mountings and Air Compressing Machinery	359,171	256,459	102,712	..
H.—Machinery for Her Majesty's Shore Establishments at Home and Abroad	30,000	32,500	..	2,500
I.—Royal Reserve of Merchant Cruisers.	34,000	22,000	12,000	..
J.—Interest on Advances under Naval Defence Act, 1889	70,636	57,536	13,100	..
£	2,959,700	1,305,600	1,656,700	2,600
Deduct,—				
K.—Appropriations in Aid	39,500	39,600	..	100
£	2,920,200	1,266,000	1,656,700	2,500
	Net Increase		£1,654,200	

PROGRAMME of the ESTIMATED EXPENDITURE in CASH, and in NET REPAIRS, MAINTENANCE, &c.,

SUB-HEADS under which this ESTIMATED EXPENDITURE will be provisions of Sec. 1 (2), ARMY

	ESTIMATES,				
	Direct Expenditure.				
	Dockyard Work.		Contract Work, Sec. III.	Total.	Under Section I. (3), of Naval Defence Act (1889.) (e)
	Personnel, Sec. I.	Matériel, Sec. II.			
NEW CONSTRUCTION:	£	£	£	£	£
Dockyard-Built Ships: **New Programme** (Naval Defence Act, Sec. 1 (3) (b))	170,930	56,865	59,830	287,625	..
Contract-Built Ships: **New Programme** (Naval Defence Act, Sec. 1 (3) (b), (Fitting and Equipping at Dockyards)	..	..	(c) 4,518	4,518	..
A.—TOTAL	**(d) 170,930**	**56,865**	**64,348**	**292,143**	..
Contract-Built Ships:					
B.—New Programme (Naval Defence Act, Sec. 1 (3) (a))	..	..	..	..	9,495
TOTAL NEW CONSTRUCTION UNDER NAVAL DEFENCE ACT	**170,930**	**56,865**	**64,348**	**292,143**	**9,495**
C.—NEW VESSELS NOT INCLUDED IN ABOVE):					
FURTHER PROGRAMME:					
Dockyard-Built	616,350	1,025,353	382,513	2,024,216	..
Contract-Built (including First Class Torpedo Boats)	23,110	17,405	2,086,007	2,126,522	..
TOTAL	**639,460**	**1,042,758**	**2,468,520**	**4,150,738**	..
SMALL VESSELS, &c.:					
Dockyard-Built	..	..	..	..	..
Contract-Built	1,700	1,700	64,929	68,329	..
TOTAL	**1,700**	**1,700**	**64,929**	**68,329**	..
TOTAL NEW CONSTRUCTION NOT UNDER THE NAVAL DEFENCE ACT	**641,160**	**1,044,458**	**2,533,449**	**4,219,067**	..
TOTAL—NEW CONSTRUCTION	**812,090**	**1,101,323**	**2,597,797**	**4,511,210**	**9,495**
D.—RE-CONSTRUCTION, REPAIRS, ALTERATIONS, &c.	..	..	..	785,458	..
E.—SEA STORES, COALS, &c.	..	..	..	986,191	..
F.—ESTABLISHMENT, INCIDENTAL, AND MISCELLANEOUS CHARGES, UNAPPROPRIATED	..	..	..	..	..
			£	**6,282,859**	**9,495**

(c) Steamboats for Ships building under the Naval Defence Act.
(d) Including £11,210 available out of savings in previous years.
(e) Excluding Guns, Torpedoes, and Ammunition.

VALUES OF STORES issued for SHIPBUILDING, RE-CONSTRUCTION, in the Year 1894–95.

accounted for in the NAVY EXPENSE ACCOUNTS, under the AND NAVY AUDIT ACT, 1889.

1894–95.			1893–94.			Difference between Direct Expenditure, 1893–94 (B) and 1894–95. (A)	
Total Direct Expenditure. (A)	Establishment, &c., Charges, apportioned.	Aggregate, 1894–95.	Direct Expenditure. (B)	Establishment, &c., Charges, apportioned.	Aggregate, 1893–94.	Increase.	Decrease.
£	£	£	£	£	£	£	£
287,625	45,525	333,150	1,253,547	163,994	1,417,541	..	965,922
4,518	92	4,610	128,025	16,346	144,371	..	123,507
292,143	45,617	337,760					
9,495	..	9,495	538,355	..	538,355	..	528,860
301,638	45,617	347,255	1,919,927	180,340	2,100,267		
2,024,216	196,964	2,221,180	509,440	47,385	556,825	1,514,776	..
2,126,522	49,233	2,175,755	456,928	13,759	470,687	1,669,594	..
4,150,738	246,197	4,396,935					
..	..	..	3,310	..	3,310	..	3,310
68,329	1,853	70,182	47,356	1,483	48,839	20,973	..
68,329	1,853	70,182					
4,219,067	248,050	4,467,117	1,017,034	62,627	1,079,661		
4,520,705	293,667	4,814,372	2,936,961	242,967	3,179,928	1,583,744	..
785,458	80,632	866,090	796,374	85,950	882,324	..	10,916
986,191	45,676	1,031,867	886,510	49,910	936,420	99,681	..
..	1,223,049	1,223,049	..	931,156	931,156	..	..
6,292,354	1,643,024	7,935,378	4,619,845	1,309,983	5,929,828		

NET INCREASE ON DIRECT EXPENDITURE . . £1,672,509.

RECAPITULATION OF ESTIMATED EXPENDITURE.

HEADS OF EXPENDITURE.	ESTIMATED EXPENDITURE.		ESTIMATED DISTRIBUTION OF THE DIRECT AND INCIDENTAL EXPENDITURE.							
			Naval Construction.				Stores for Ships, Coals for Steaming, &c.	Establishment and Incidental Charges Unapportioned to Ships, &c.		Total Amount of Estimated Expenditure.
			New Construction.	Re-construction, Repairs, Alterations, and Refits.						
	Charged direct as Incurred.	Establishment and Incidental Charges Apportioned.		Ships Re-constructing.	Ships for Reliefs, or Re-commission.	Ships in Commission and Reserve.		Fleet, Port, National, and Unappropriated Charges.	Unappropriated Charges (Haulbowline, Deptford, and Naval Yards Abroad).	
	(a.)	(b.)	(c.)	(d.)	(e.)	(f.)	(g.)	(h.)	(i.)	(k.)
SUB-HEADS OF EXPENDITURE.			A. and C.	D.			E.	F.		
	£	£	£	£	£	£	£	£	£	£
SECTION I.—DOCKYARD WORK. PERSONNEL .	1,206,570	777,573	987,626	81,596	121,661	247,345	34,058	341,165 9,074*	161,618	1,984,143
SECTION II.—DOCKYARD WORK. MATÉRIEL .	2,284,690	672,798	1,165,531	31,031	61,742	129,913	993,085	450,565 3,506*	147,660	2,957,488
SECTION III.—CONTRACT WORK . . .	2,791,599	192,653	2,651,720	50,360	38,361	104,081	4,724	109,461	..	2,984,252
TOTAL ESTIMATED EXPENDITURE for 1894–95 . . . . £	6,282,859	1,643,024	4,804,877	162,987	221,764	481,339	1,031,867	913,771	309,278	7,925,883
TOTALS OF SUB-HEADS £	7,925,883		4,804,877	866,090			1,031,867	1,223,049		7,925,883
Add,—B. NEW CONSTRUCTION, by Contract, provided for under Naval Defence Act, Section 1 (3) (*a*)			9,495							
TOTAL NEW CONSTRUCTION . . . . . £			4,814,372							

* Proportion of Establishment, &c., Charges incidental to Manufactures, which cannot be included in the Issuing Prices, *vide* Section 6 (1) of Naval Defence Act.

Explanatory Observations on the Navy Estimates by the Financial Secretary.

Vote A.—The following table shows the growth of numbers during five years.

1890–91.	1891–92.	1892–93.	1893–94.	1894–95.
Numbers.	Numbers.	Numbers.	Numbers.	Numbers.
68,800	71,000	74,100	76,700	83,400

This increase in 1894–95 is mainly due to the addition of 2553 seamen, 2805 engine-room ratings, and 500 Royal Marines.

Royal Naval Reserves.

Vote 7.—Provision has been made for considerable additions both of officers and men to the Royal Naval Reserves.

Dockyard Shipbuilding (including Armaments) Naval Defence Acts, 1889 and 1893.

Votes 8 and 9.—The actual and estimated expenditure under the Naval Defence Acts for the purpose of Dockyard Shipbuilding (*a*), in accordance with the Schedule of the Naval Defence Act, 1889, and for the purpose of the armament of the Dockyard vessels, is as follows :—

Expenditure.	Shipbuilding. Vote 8.	Armaments. Vote 9.	Total.
	£	£	£
Actual Expenditure to 31st March 1893	8,127,285	1,766,206	9,893,491
Anticipated Expenditure, 1893–94 .	1,394,283	437,894	1,832,177
Estimated Expenditure, 1894–95 .	292,143	203,900	496,043
Estimated Total . £	9,813,711	2,408,000	12,221,711
Statutory Limit (Naval Defence Act, 1889)	8,650,000	2,850,000	11,500,000
Amended Statutory Limit (Naval Defence Act, 1893)	10,000,000	2,850,000	12,850,000
Estimated Difference between Amended Limit and Expenditure . . . . . £	186,289 Less than Limit.	442,000 Less than Limit.	628,289 Less than Limit.

(*a*) This includes completing for sea in the dockyards the contract vessels (Naval Defence Act, 1889, Sect. 1 (3 *b*)).

In addition to the above expenditure under the Acts, the sum of £1,924,472 was spent under the proviso of Sub-section 1 of Section 3 of the Naval Defence Act, 1889, in the years 1889–90 to 1893–94, in "completing for sea the vessels not mentioned in the Schedule to the Act, which were already begun before" 1st April, 1889. The statutory limit of £10,000,000 does not apply to expenditure on these Old Programme vessels.

Contract Shipbuilding (including Armaments) Naval Defence Act, 1889.

The cost of these vessels and of their armaments is not provided in the Navy Estimates, but is met out of the charge of £1,428,571 made annually on the Consolidated Fund during the seven years ending 31st March, 1896. (*a*)

The account for these vessels stands as follows :—

	Shipbuilding.	Armaments.	Total.
	£	£	£
Actual Expenditure to 31st March, 1893 .	7,640,768	1,302,849	8,943,617
Anticipated Expenditure in 1893–94 .	674,468	365,283	1,039,751
Estimated Expenditure in 1894–95 .	9,495	7,137	16,632
Total . . . . . £	8,324,731	1,675,269	10,000,000

The limit of expenditure for these ships under the Act was £10,000,000,

Further Programme, *i.e.* Dockyard and Contract Shipbuilding (including Armaments) not under Naval Defence Act, 1889.

	Shipbuilding.	Armaments.	Total.
	£	£	£
Actual Expenditure, 1892–93 . .	118,891	12,000	130,891
Anticipated Expenditure, 1893–94 .	933,002	115,000	1,048,002
Estimated Expenditure, 1894–95 . .	4,219,067	450,000	4,669,067
£	5,270,960	577,000	5,847,960

Provision in 1894–95 to meet Expenditure on Shipbuilding (including Armaments).

	Shipbuilding. Vote 8.	Armaments. Vote 9.	Total.
Annuity charged on the Consolidated Fund for the Contract Ships (under Naval Defence Act)			£ (*b*) 1,428,571
To be Voted in Navy Estimates, 1894–95 :	£	£	
For Ships Building (under Naval Defence Acts)	280,933	nil	280,933
For Further Programme (not under Naval Defence Act) . . .	4,219,067	450,000	4,669,067
Total Estimated Provision in 1894–95 for New Construction, including Armaments . . . £			6,378,571
In addition to the above Provision there are also available for Dockyard Shipbuilding, Savings on Shipbuilding and Armaments of Previous Years (under Naval Defence Acts) estimated at .	11,210	203,900	215,110

8th March, 1894. UGHTRED J. KAY-SHUTTLEWORTH.

(*a*) A charge, however, falls on the Navy Estimates (Vote 8, Sect. iii.) for interest on advances made under Naval Defence Act, 1889, Sect. 2, on account of contract ships, as follows :—1892–93, £15,567 ; 1893–94, £57,536 ; 1894–95, £70,636.

(*b*) As the total estimated expenditure in 1894–95 on account of the Contract Ships building under the Naval Defence Act amounts to £16,632, there will be a balance of £1,411,939 available towards repaying to the Consolidated Fund advances made in previous years.

List of New Ships and Vessels Estimated to be passed into the Fleet Reserve during the Years 1894–95 and 1893–94.

1894–95.

Name of Ship.	Class	Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.
ARMOURED SHIPS:				
Nil.		..	..	..
PROTECTED SHIPS:				
Fox	Cruisers, Second Class	4,360	9,000	10
Flora	Cruisers, Second Class	4,360	9,000	10
Forte	Cruisers, Second Class	4,360	9,000	10
Charybdis	Cruisers, Second Class	4,360	9,000	10
Hermione	Cruisers, Second Class	4,360	9,000	10
UNPROTECTED SHIPS:				
Halcyon	Torpedo Gun-boats, First Class.	1,070	3,500	2
Harrier	Torpedo Gun-boats, First Class.	1,070	3,500	2
Hussar	Torpedo Gun-boats, First Class.	1,070	3,500	2
Torpedo Boat Destroyers	37 No.	various		4 to 6

1893–94.

Name of Ship.	Class	Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.
ARMOURED SHIPS:				
Empress of India	Battleships, First Class.	14,150	13,000	14
Repulse	Battleships, First Class.	14,150	13,000	14
Barfleur	Battleships, First Class.	10,500	13,000	14
Centurion	Battleships, First Class.	10,500	13,000	14
Ramillies	Battleships, First Class.	14,150	13,000	14
Resolution	Battleships, First Class.	14,150	13,000	14
Royal Oak	Battleships, First Class.	14,150	13,000	14
Revenge	Battleships, First Class.	14,150	13,000	14
PROTECTED SHIPS:				
Crescent	Cruisers, First Class.	7,700	12,000	13
Endymion	Cruisers, First Class.	7,350	12,000	12
St. George	Cruisers, First Class.	7,700	12,000	12
Gibraltar	Cruisers, First Class.	7,700	12,000	12
Grafton	Cruisers, First Class.	7,350	12,000	12
Theseus	Cruisers, First Class.	7,350	12,000	12
Cambrian	Cruisers, Second Class.	4,360	9,000	10
Astræa	Cruisers, Second Class.	4,360	9,000	10
Bonaventure	Cruisers, Second Class.	4,360	9,000	10
UNPROTECTED SHIPS:				
Antelope	Torpedo Gun-boats, First Class.	810	3,500	2
Dryad	Torpedo Gun-boats, First Class.	1,070	3,500	2
Hazard	Torpedo Gun-boats, First Class.	1,070	3,500	2
Hebe	Torpedo Gun-boats, First Class.	810	3,500	2
Leda	Torpedo Gun-boats, First Class.	810	3,500	2
Onyx	Torpedo Gun-boats, First Class.	810	3,500	2
Renard	Torpedo Gun-boats, First Class.	810	3,500	2
Speedy	Torpedo Gun-boats, First Class.	810	4,500	2
Jaseur	Torpedo Gun-boats, First Class.	810	3,500	2
Niger	Torpedo Gun-boats, First Class.	810	3,500	2
Torpedo Boat Destroyers	5 No.	215	3,300	4

French Navy Estimates for the Years 1894 and 1893.

Cap.	Heads of Expenditure.	Credits proposed for the year 1894.	Credits allowed for the year 1893.
		£	£
	PERSONNEL.		
1	Admiralty Office	61,179	60,629
2	Navy Pay	1,655,367	1,582,082
3	Marines.	470,676	452,676
4	Gendarmerie Maritime	32,453	32,453
5	Inspection of Administrative and Financial Service	10,349	10,349
6	Construction Staff	81,720	81,720
7	Administrative Staff	299,787	299,787
8	Medical Staff.	86,878	89,245
	LABOUR.		
	Wages—		
9	Shipbuilding; new ships; conversions; fitting for sea	478,960	469,200
10	Shipbuilding; repairs	249,200	241,160
11	Armaments; construction of new guns .	45,080	45,080
12	Armaments; repairs	54,930	54,930
13	Works	40,012	40,012
14	Victualling	18,230	18,230
15	Master-attendants' and Storekeepers' Departments	256,472	256,844
16	Miscellaneous	14,670	14,670
	MATÉRIEL.		
	Stores and Supplies—		
17	Admiralty	9,472	9,072
18	Ships fitting for sea; repairs . .	534,317	430,938
	Carried forward . .	£4,399,752	£4,189,077

Cap.	Heads of Expenditure.	Credits proposed for the year 1894.	Credits allowed for the year 1893.
		£	£
	Brought forward . .	4,399,752	4,189,077
	MATÉRIEL—*continued.*		
	Stores and Supplies—*continued.*		
19	Shipbuilding; contracts for new ships .	1,426,760	941,120
	Supplementary for ditto . . .	264,000	336,600
20	Shipbuilding; new ships; conversions; fitting for sea	880,000	1,171,200
21	Armaments; manufacture of new guns .	300,000	320,000
	Supplementary for ditto . . .	40,000	40,000
22	Armaments; repairs	593,101	593,101
23	Torpedoes	159,760	179,320
24	Works; new and large alterations. .	169,573	91,160
	Ditto Supplementary for Defence of Military Ports	180,000	132,000
25	Works; repairs	53,200	53,200
26	Clothing	196,608	190,232
27	Victualling.	984,779	937,336
28	Barracks	38,882	47,682
29	Medicines	64,083	54,969
30	Machinery	219,339	219,339
31	Fuel and Lighting	30,869	30,589
32	Office Furniture, Printing and Stationery	42,496	41,937
	MISCELLANEOUS.		
33	Travelling expenses and freight . .	110,134	110,134
34	Allowance for lodging	146,144	146,144
35	Charitable	49,662	49,562
36	Pensions to Seamen	340,819	330,699
37	Secret Service	2,600	2,600
38	Miscellaneous	10,300	10,300
	Total . . .	£10,702,861	£10,218,301

Authorised Programme of New Construction, to be continued or undertaken in 1894.—Building in Dockyards.

A.—*Hulls, Fittings and Outfit.*

Class.	Names of Ships.	Date of Order for Building.	Where Building.	Expenditure to be incurred in 1894.	State of advancement in hundredths. To 1st Jan., 1894.	State of advancement in hundredths. To 31st Dec., 1894.
				£		
Battleships	Brennus	Jan. 1889	Lorient	27,344	98	100
	Charles Martel	Aug. 1891	Brest	253,576	54	84
	Lazare Carnot	July 1891	Toulon	247,083	52	77
	Bouvet	Jan. 1893	Lorient	196,182	14	38
	Charlemagne	..	Brest	28,720	..	7
	Saint-Louis	..	Lorient	26,760	..	7
Coast Defence Ironclad	Tréhouart	Oct. 1890	Lorient	49,845	82	100
Armoured Cruisers, First class	Charner	Jan. 1891	Rochefort	12,739	100	..
	Bruix	Nov. 1891	Rochefort	90,922	58	91
Second-class Protected Cruisers	Pascal	..	Toulon	37,238	8	29
	Suchet	Oct. 1887	Toulon	26,089	83	100
	Bugeaud	April 1892	Cherbourg	47,271	48	79
	Chasseloup-Laubat	Oct. 1891	Cherbourg	47,313	71	100
	Friant	Dec. 1891	Brest	43,349	75	100
	Du Chayla	..	Cherbourg	33,512	5	23
	Catinat	..	Cherbourg	7,400	..	7
Third-class Protected Cruisers	Galilée	..	Rochefort	29,135	10	38
	Lavoisier	..	Rochefort	6,680	..	8
Submarine Boat	Morse	..	Cherbourg	9,087	40	100
				£1,220,245		

AUTHORISED PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1894.—BUILDING IN DOCKYARDS—*continued.*

B.—*Machinery.*

Class.	Names of Ships.	Expenditure to be incurred in 1894.	State of Advancement in Hundredths.	
			To 1st Jan., 1894.	To 31st Dec., 1894.
		£		
Battleships	Brennus	14,210	98	100
	Charles-Martel	24,617	..	..
	Lazare-Carnot	20,224	66	94
	Bouvet	44,855	41	78
	Saint-Louis	2,000	..	6
Coast Defence Ironclad	Tréhouart	7,296	84	100
Armoured Cruisers, first class	Charner	12,005	..	..
	Bruix	9,280	..	..
Second-class Protected Cruisers	Pascal	40,800	..	..
	Suchet	2,952	94	100
	Bugeaud	4,024	..	..
	Friant	12,866	..	..
	Du Chayla	14,800	17	48
Third-class Protected Cruisers	Galilée	12,172	16	53
	Lavoisier	600	..	5
Submarine Boat	Morse	9,600	..	..
	Machinery . . Total	232,301		
	Hulls, Fittings, and Outfit	1,220,245		
		1,452,546		
Payments to be made in 1894 on account of amounts retained to meet contingencies		60,495		
		1,513,041		
Supplementary Work on Ships built by contract		84,548		
Extras		17,160		
		1,614,749		
Less 22·5 per cent. to be retained to meet contingencies		255,553		
TOTAL CONSTRUCTION IN DOCKYARDS £		1,359,196		

AUTHORISED PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1894.—BUILDING BY CONTRACT.

Class.	Names of Ships.	Contractors.	Dates of Contract.	Price.	Payments in 1894, including Hulls, Armament, Fittings, and Engines.
				£	£
Battleships	Jauréguiberry	Soc. de la Méditerranée	April 8, 1891	902,977	191,826
	Masséna	Soc. de la Loire	May 18, 1892	912,707	288,470
	Henri IV.	..	..	..	40,000
Armoured Cruisers, First-class	Chanzy	Soc. de la Gironde	Dec. 18, 1889	354,194	62,052
	Latouche-Tréville	Soc. de la Méditerranée	Dec. 18, 1889	353,670	44,012
	Pothuau	Soc. de la Méditerranée	Jan. 11, 1893	362,011	149,019
	D'Entrecasteaux	Soc. de la Méditerranée	..	..	137,600
Second-class Protected Cruiser	Descartes	Soc. de la Loire	Aug. 17, 1892	258,800	86,800
	E 4 (New Ship)	..	..	..	23,200
	E 5 Ditto	..	..	..	23,200
	E 6 Ditto	..	..	..	23,200
	D'Assas	..	..	..	71,960
	G 3 (New Ship)	..	..	..	23,600
Third-class Protected Cruisers	Linois	Soc. de la Méditerranée	Aug. 3, 1892	163,202	66,800
Torpedo Cruiser	Foudre	Soc. de la Gironde	June 8, 1892	353,600	79,924
Second-class Sloop	U 1 (New Vessel)	..	..	..	16,000
Torpedo Gunboats	Cassini	Soc. de la Méditerranée	Nov. 16, 1892	96,600	72,800
	Casabianca	..	..	..	40,000
Gunboat	Surprise	Normand	Mar. 29, 1893	38,400	19,600
Steam Launches	Onyx	..	..	..	5,000
	X 2 (New Boat)	..	..	..	1,200
	X 3 Ditto	..	..	..	1,200
			Carried forward		£1,467,493

AUTHORISED PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1894.—BUILDING BY CONTRACT—*continued.*

Class.	Names of Ships.	Contractors.	Dates of Contract.	Price.	Payments in 1894, including Hulls, Armament, Fittings, and Engines.
				£	£
			Brought	forward .	1,467,493
Sea-going Torpedo Boats . . .	Flibustier . .	Normand . . .	Aug. 31, 1892	20,720	9,384
	Ariel	Normand . . .	Aug. 31, 1892	20,720	10,184
	Tourmente . .	Soc. de la Loire .	Aug. 31, 1892	20,320	9,908
	Argonaute . .	Soc. de la Loire .	Aug. 31, 1892	20,320	9,908
	Averne . . .	Soc. de la Méditerranée . . .	Aug. 31, 1892	20,320	11,503
	Dauphin . . .	Soc. de la Méditerranée . . .	Aug. 31, 1892	20,320	11,503
	Forban . . .	Normand . . .	Feb. 15, 1893	36,000	26,000
	N 12 (New Ship)	..	..	..	20,000
First-class Torpedo Boats .	Two—180, 181 .	Schneider . .	Nov. 25, 1891	25,092	1,322
	Six—182 to 187 .	Normand . . .	July 27, 1892	87,480	51,969
	Four—188 to 191	Soc. de la Méditerranée . .	Oct. 12, 1892	54,080	31,639
	Three—192 to 194	Soc. de la Gironde	Oct. 12, 1892	40,680	23,850
	Four—195 to 198	Soc. des Établissements Cail .	Nov, 23, 1892	53,600	40,770
	Two—199, 200 .	..	..	..	16,800
	Five—P20 to P24	..	..	..	40,000
Second-class Torpedo Boats . .	Four—Q 1 to Q 4	..	..	..	24,000
Torpedo Carriers	Two—A and B .	..	..	..	6,240
	Seven—R 3 to R 9	..	..	..	16,000
Submarine Boat .	Goubet . . .	Goubet . . .	Sept. 12, 1886	800	800
					1,829,273
Payments to be made in 1894 on account of amounts retained to meet contingencies					13,000
					1,842,273
Less 22·5 per cent. to be retained to meet contingencies					414,250
TOTAL BUILDING BY CONTRACT . . .				£	1,428,023

Authorised Programme of New Construction, to be continued or undertaken in 1894.—Building by Contract—*continued.*

Class.	Names of Ships.	Contractors.	Dates of Contract.	Price.	Payments in 1894, including Hulls, Armament, Fittings and Engines.
				£	£
Coast Defence Ironclads	Bouvines	Soc. de la Méditerranée	Dec. 18, 1889	509,570	87,000
	Jemmapes	Soc. de la Loire	Dec. 18, 1889	505,053	59,505
	Valmy	Soc. de la Loire	Dec. 18, 1889	505,012	108,703
Torpedo Sloop	D'Iberville	Soc. de la Loire	Aug. 26, 1891	97,053	26,041
Sea-going Torpedo Boat	Lansquenet	Orielles à Nantes	Mar. 23, 1892	22,101	8,891
					290,140
Less 9 per cent. to be retained to meet contingencies					26,112
Total					£264,028

German Navy Estimates, 1894–95.

ORDINARY PERMANENT ESTIMATES.

——	1894–95.	1893–94.
	£	£
Naval Cabinet and Chief Command Department; Imperial Naval Office	49,302	47,956
Observatories	13,654	13,535
Salaries, Wages, &c., Scientific Department	13,371	13,531
Martial Law	1,597	1,597
Divine Service	3,070	2,953
Military Personnel	569,713	534,072
Maintenance of Ships and Vessels in Commission	573,298	487,609
Victualling; Clothing	52,162	56,259
Barrack Administration, Cashiers, and Accountants	63,179	57,278
Lodging Allowance	47,796	45,439
Medical	44,243	39,129
Travelling Expenses, Freight Charges, &c.	71,686	87,559
Training Establishments	10,053	9,183
Dockyard Expenses	765,466	737,830
Ordnance and Fortification	226,038	221,982
Accountant-General's Department	18,193	17,791
Pilotage, Buoys, and Lights	19,407	16,248
Miscellaneous Expenses	26,237	22,681
Total £	2,568,465	2,412,632

Ordinary Special Estimates.

Shipbuilding Programme, 1894–1895.

For the Construction of—	£
Ironclad Weissenburg (C), 6th and final instalment	50,000
,, Kurfürst Friedrich Wilhelm, 6th and final instalment .	111,500
Armoured Vessel Hagen, 4th and final instalment . . .	60,000
,, ,, Heimdall, 4th and final instalment. . .	35,000
,, ,, T, 3rd instalment	60,000
,, ,, V, ,, ,, ...	60,000
Cruiser F, 2nd and final instalment	75,750
Despatch Vessel H, 2nd and final instalment	53,350
Divisional Torpedo-boat, 2nd and final instalment . . .	21,165
Ironclad to replace Preussen, 1st instalment	50,000
,, to replace Leipzig ,, ,, ...	50,000
Despatch Vessel to replace Falke, 1st instalment . . .	60,000
Total	£686,765

Summary.

———	1894–95.	1893–94.
	£	£
Ordinary Permanent Estimates	2,568,465	2,412,632
Ordinary Special Estimates—		
Shipbuilding	686,765	947,725
Guns	316,740	555,237
Torpedoes	65,000	
Other Items	192,857	
Extraordinary Estimates	307,640	530,950
Total . . . . £	4,137,467	4,446,544

Italian Estimates, 1894–95.

Navy Estimates.—Financial Year 1st July, 1894, to 30th June, 1895.

Ordinary Expenditure—General Expenses.

———	1894–5.	1893–4.
	£	£
Admiralty	45,960	46,180*
Expenditure on various services connected with the Mercantile Marine	158,051	158,850*
Total . . £	204,011	205,030

Expenditure for Naval Services.

Ships fitting out, in reserve and completing	226,800	213,800*
General Staff of the Navy	123,765	116,077*
Corps of Constructors	42,947	42,147*
Commissariat Service	39,781	42,715*
Medical Service	27,474	26,674*
Wages—Men	457,565	434,754*
Gratuities	34,200	33,000
Assistants to Constructors	46,131	44,051*
Accountants	34,574	29,920*
Police	10,762	10,762
Telegraph Service	6,433	7,633
Telegraph Materials	8,000	8,000
Provisions	303,448	295,842*
Lighting	7,441	8,405
Hospital Services	18,700	17,900*
Honorary Distinctions	640	800
Fuel	159,840	159,840*
Salaries and Wages—Workshops and Fortifications	7,304	7,104*
Training Establishments	20,598	23,086*
Naval Academy	8,800	10,000
Scientific Services—*Personnel*	2,160	2,148*
,, ,, *Materiel*	10,400	10,400*
Law Charges	1,200	1,220
Transport	25,600	33,600*
Materials for repair of Ships	272,000	272,000*
Labour for same	237,773	237,773*
Carried forward . . . . £	2,134,336	2,089,651

* These figures are taken from the most recent estimate, and differ slightly from those given in last year's *Annual*.

—	1894–5.	1893–4.
	£	£
Brought forward	2,134,336	2,089,651
Guns, Torpedoes and Small Arms	384,800	387,640*
Labour for construction and repairs of Armaments	86,168	84,648*
Works Department—Repairs	65,000	65,000*
Construction and Completion of the following Vessels, viz.:		
Battleships (1st Class): Sicilia		
" (2nd "): Ammiraglio di Saint Bon, at Venice; Emanuele Filiberto, at Castellammare; and two others		
Cruisers: Marco Polo, at Naples; Calabria, at Spezia; and two more vessels		
2nd Class Armoured Cruisers: Carlo Alberto (F), at Spezia; Vettor Pisani (S), at Castellammare; Giuseppe Garibaldi (A), by Messrs. Ansaldo; Varese (B), by Messrs. Orlando; and another vessel	1,000,000	1,000,000
Torpedo Cruisers: Governolo, at Venice; Caprera (Clio), by Messrs. Orlando; and two vessels of the Partenope type		
Torpedo Catchers (two)		
Sea-going Torpedo Boats		
Small Craft		
Naval Expenditure at Massowah	..	18,807
Total £	3,670,304	3,645,746
Rents for lands occupied by Government £	..	106,072

EXTRAORDINARY EXPENDITURE.

	£	£
Half Pay	1,600	1,600
Mercantile Marine—Construction at Naples	7,200	4,000*
Naval Yard at Taranto	44,000	64,000
Works at Dockyard, Spezia	..	20,000
Coast Defence	4,000	4,000
Fortifications, Maddalena	20,000	20,000
Torpedoes	44,000	44,000
Total £	119,200	156,000

SUMMARY.

	£	£
Admiralty and Mercantile Marine	204,011	205,030
Naval Services	3,670,304	3,645,746
Rent of land occupied by Government	..	106,072
Extraordinary Expenditure	119,200	156,000
Grand Totals £	3,993,515	4,112,848

* These figures are taken from the most recent estimate, and differ slightly from those given in last year's *Annual*.

Russian Navy Estimates, 1894.

CALCULATED AT £1 = 9 Roubles.

——	1894.	1893.
	£	£
Central Administration	199,832	199,031
Rewards, Pensions, Education of Children	47,944	51,056
Naval Schools	65,147	63,373
Medical	90,222	88,166
Wages	374,005	370,292
Provisions	103,325	120,504
Clothing	132,667	123,056
Navigation	764,193	678,451
Hydrographic Office	58,234	56,563
Guns, Torpedoes, and Electric Light	672,355	630,438
Construction	2,255,627	2,297,102
Workshops and Offices	341,949	331,174
Hire, Maintenance, Construction, and Repair of Buildings	396,073	351,167
Religion	50,888	50,889
Defence of Port of Sveaborg	7,606	8,874
Expenditure on account of Estimates for 1895	20,711	20,079
Sundries	111,599	103,429
Total . . . . . . £	5,692,377	5,543,644

United States Navy Estimates, 1894-95.

Calculated at £1 = $5.

Detailed objects of Expenditure and Explanation.	Appropriations, 1893.	Appropriations, 1894 (current Year).	Estimates, 1895.
General Establishment—	£	£	£
Pay of the Navy . . .	1,460,000	1,460,000	1,495,000
Pay miscellaneous . .	48,000	48,000	48,000
Contingent Navy . .	1,400	1,400	1,400
Bureau of Yards and Docks—			
Ordinary Expenses . .	75,319	75,142	140,762
Public Works . . .	117,780	209,049	80,766
Bureau of Navigation—			
Ordinary Expenses . .	23,200	20,600	55,350
Naval Academy . . .	37,813	37,413	39,420
Bureau of Equipment. . .	191,205	191,205	226,205
Bureau of Ordnance . . .	65,965	64,965	129,160
Bureau of Construction . .	193,995	193,995	183,995
Bureau of Steam Engineering .	137,580	141,580	203,580
Bureau of Supplies and Accounts	239,506	239,506	257,506
Bureau of Medicine and Surgery.	21,000	21,000	25,000
Marine Corps—			
Pay Department . . .	137,508	139,295	140,400
Quartermaster's Department.	49,882	50,842	52,842
Naval Observatory . . .	3,500	3,300	4,791
Naval Review	10,000	..	2,000
Total running Expenses .	2,816,653	2,897,292	3,086,177
Increase, Navy—			
Bureau of Yard and Docks .	12,000	..	..
Bureau of Equipment . .	80,000	50,000	..
Bureau of Ordnance . .	400,000	40,000	1,300,000
Construction and Machinery	1,400,000	1,375,000	1,191,005
Total increase, Navy .	1,892,000	1,465,000	2,491,005
Grand Total . . .	£4,708,653	£4,362,292	£5,577,182

Comparative Tables of British, French, and Russian Ships, as given in the 'Naval Annual' for 1888-89, and subsequent volumes, and now brought up to present date.

TABLE I.—FIRST-CLASS BATTLESHIPS.

ENGLAND.			FRANCE.			RUSSIA.		
Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		Tons.			Tons.†			Tons.
1886	Anson	10,600	1883	Amiral Baudin	11,380	1886	Catherine II.	10,180
1893	Barfleur	10,500	1879	Amiral Duperré	10,487	1892	Gheorghy Pobyedonosets	10,280
1885	Benbow	10,600	Bldg.	Bouvet	12,200	1891	Navarin	9,476
1885	Camperdown	10,600	1891	Brennus	11,000	Bldg.	Paris	12,480
1892	Centurion	10,500	1893	Charles Martel	11,882	Bldg.	Petropaulowski	10,960
1882	Collingwood	9,500	Bldg.	Charlemagne	11,232	Bldg.	Poltava	10,960
1891	Empress of India	14,150	1881	Courbet	9,652	Bldg.	Sevastopol	10,960
1891	Hood	14,150	1879	Dévastation	9,639	1887	Sinope	10,180
1885	Howe	10,300	1885	Formidable	11,441	1886	Tchesmé	10,180
Bldg.	Magnificent	14,900	Proj.	Henri IV.	11,232	1893	Tri Sviatitelia	12,480
Bldg.	Majestic	14,900	1886	Hoche	10,650			
1888	Nile	11,940	1893	Jauréguibery	11,824			
1892	Ramillies	14,150	Bldg.	Lazare Carnot	12,008			
Bldg.	Renown	12,350	1890	Magenta	10,600			
1892	Repulse	14,150	1887	Marceau	10,581			
1892	Resolution	14,150	Bldg.	Masséna	11,900			
1892	Revenge	14,150	1887	Neptune	10,630			
1884	Rodney	10,300	Bldg.	St. Louis	11,232			
1892	Royal Oak	14,150						
1891	Royal Sovereign	14,150						
1887	Sans Pareil	10,470						
1887	Trafalgar	11,940						
	Total 22 Ships*	272,600		Total 18 Ships	199,570		Total 10 Ships.. ..	108,136

* Seven new battleships are projected, to bring England to a standard of equality with France and Russia combined. † French tons.

TABLE II.—SECOND-CLASS BATTLESHIPS.

ENGLAND.			FRANCE.			RUSSIA.		
Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		Tons.			Tons.			Tons.
1879	Agamemnon	8,660	1892	Bouvines	6,610	1887	Alexander II.	8,440
1880	Ajax	8,660	1885	Caiman	7,200	1890	Dvenadsat Apostoloff	8,076
1875	Alexandra	9,490	1875	*Colbert	8,457	1890	Gangoot	6,592
1882	Colossus	9,420	1873	Friedland	8,824	1889	Nicolai I.	8,440
1871	Devastation	9,330	1883	Indomptable	7,168	1872	Peter the Great	8,750
1875	Dreadnought	10,820	1876	Redoutable	8,860	Bldg.	Cizoi Veliky, No. 1. ..	8,880
1882	Edinburgh	9,420	1885	Requin	7,200	Bldg.	Cizoi Veliky, No. 2 ..	8,880
1868	Hercules	8,680	1873	*Richelieu	8,767	Pro.	Cizoi Veliky, No. 3 ..	8,880
1876	Inflexible	11,880	1881	Terrible	7,713			
1874	Neptune	9,310	1893	Tréhouart	6,610			
1870	Sultan	9,290	1876	*Trident	8,456			
1875	Superb	9,170						
1876	Temeraire	8,540						
1872	Thunderer	9,330						
	Total 14 Ships ..	132,000		Total 11 Ships ..	85,865		Total 8 Ships ..	66,856

* These ships are built of wood.

TABLE III.—THIRD-CLASS BATTLESHIPS.

ENGLAND.			FRANCE.			RUSSIA.		
Launched.	Name.	Displacement.	Lau ched.	Name.	Displacement.	Launched.	Name.	Displacement.
		Tons.			Tons.			Tons.
1869	Audacious	6,010	1872	La Galissonnière	4,700	Nil.	Nil.	Nil.
1865	Bellerophon	7,550	1869	Marengo	7,748			
1881	Conqueror	6,200	1868	Océan	7,750			
1885	Hero	6,200	1870	Suffren	7,782			
1869	Invincible	6,010	1877	Triomphante	4,700			
1870	Iron Duke	6,010	1875	Victorieuse	4,700			
1868	Monarch	8,320						
1867	Penelope	4,470						
1870	Swiftsure	6,910						
1870	Triumph	6,640						
	Total 10 Ships	64,320		Total 6 Ships	37,380			

Table IV.—Look-Out Ships.

England			France		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
Knots.		Tons.	Knots.		Tons.
17	Alacrity	1,700	19¼	Coetlogon	1,848
16½	Archer	1,700	17¾	Condor	1,240
17¾	Barham	1,830	20½	Cosmao	1,877
16¾	Barracouta	1,500	17	Epervier	1,240
16¾	Barrosa	1,580	17½	Faucon	1,240
17¾	Bellona	1,830	18	Fleurus	1,310
16¾	Blanche	1,580	20½	Forbin	1,848
16¾	Blonde	1,580	20½	Lalande	1,877
16½	Brisk	1,770	20½	Surcouf	1,848
16½	Cossack	1,770	20½	Troude	1,877
16¾	Fearless	1,580	17½	Vautour	1,280
18	Iris	3,730	18½	Wattignies	1,310
18	Mercury	3,730			
16½	Mohawk	1,770			
16½	Porpoise	1,770			
17½	Racoon	1,770			
16¾	Scout	1,580			
17	Surprise	1,700			
16½	Tartar	1,770			
	Total 19 Ships	36,240		Total 12 Ships	18,795

TABLE V.—TORPEDO GUN VESSELS.

ENGLAND.			FRANCE.			RUSSIA.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
Knots.		Tons.	Knots.		Tons.	Knots.		tons.
19¼	Alarm	810	18½	Bombe	395	20	Captain Sacken	700
19¼	Antelope	810	21½	Casabianca	945	22	Gaidamak	500
20	Boomerang	735	21½	Cassini	945	22	Griden	400
19¼	Circe	810	18 0	Couleuvrine	395	21	Kazarsky	411
19	Dryad	1,070	18	Dague	395	20	Lieutenant Ilyn	600
20	Gleaner	735	21½	D'Iberville	925	22	Posadnik	400
19·8	Gossamer	735	18	Dragonne	395	22	Voevada	400
19	Grasshopper	525	18	Flèche	395	22	Vzadnik	500
19	Halcyon	1,070	18	Lance	395			
19	Harrier	1,070	18¾	Léger	450			
19	Hazard	1,070	18½	Lévrier	450			
19¼	Hebe	810	18	Sainte-Barbe	395			
19	Hussar	1,070	18	Salve	395			
19¼	Jaseur	810						
20	Jason	810						
20	Karrakatta	735						
19¼	Leda	810						
19¼	Niger	810						
19¼	Onyx	810						
18	Polyphemus	2,640						
18½	Rattlesnake	550						
19¼	Renard	810						
20	Salamander	735						
19	Sandfly	525						
20	Seagull	735						
20	Sharpshooter	735						
20	Sheldrake	735						
20	Skipjack	735						
20	Spanker	735						
20	Speedwell	735						
20¼	Speedy	810						
19	Spider	525						
	Total 32 Vessels ..	27,110		Total 13 Vessels ..	6,875		Total 8 Vessels ..	3,911

Table VI.—Coast Defence Ships.

England			France			Russia		
Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched,	Name.	Displacement.
		Tons.			Tons.			Tons.
1870	Abyssinia (*a*)	2,900	1885	Achéron	1,640	1868	Admiral Chicagoff ..	3,511
1876	Belleisle	4,870	1887	Cocyte	1,640	1868	Admiral Greig	3,593
1870	Cerberus (*b*)	3,480	1885	Flamme	1,046	1867	Admiral Lazareff ..	3,556
1871	Cyclops	3,560	1877	Fulminant	5,651	Building	Admiral Ortshakoff ..	4,126
1871	Glatton	4,910	1883	Furieux	6,000	Building	Admiral Senjavin ..	4,126
1871	Gorgon	3,560	1884	Fusée	1,150	1868	Admiral Spiradoff ..	3,500
1871	Hecate	3,560	1888	Grenade	1,046	1867	Charodeika	2,026
1870	Hotspur	4,010	1892	Jemmapes	6,590	1892	Gremyastchy	1,500
1871	Hydra	3,560	1886	Mitraille	1,130	1890	Grozyashtchy	1,492
1870	Magdala (*a*)	3,340	1892	Phlégéton	1,790	1865	Kreml	3,480
1879	Orion	4,870	1892	Styx	1,790	1864	Netron-Menya	3,494
1872	Rupert	5,440	1876	Tempête	4,869	1873	Novgorod	2,706
			1880	Tonnant	5,100	1892	Otvazny	1,500
			1875	Tonnerre	5,589	1863	Pervenetz	3,279
			1892	Valmy	6,590	1875	Vice-Admiral Popoff	3,590
			1878	Vengeur	4,700			
	Total 12 Ships*	48,060		Total 16 Ships	56,321		Total 15 Ships ..	45,479

(*a*) Indian Marine at Bombay. (*b*) Victorian Marine. * The Scorpion, Wivern, and Prince Albert are omitted.

TABLE VII.—ARMOURED AND PROTECTED CRUISERS.—FIRST CLASS.

ENGLAND.			FRANCE.			RUSSIA.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
Knots.		Tons.	Knots.		Tons.	Knots.		Tons.
18½	Aurora .. .. .. A.	5,600	19	Bruix (a) .. .. .. A.	4,745	16½	Admiral Nachimoff ..	7,782
18½	Australia .. .. ,,	5,600	19	Chanzy .. .. .. ,,	4,745	15½	Dimitri Donskoi	5,893
18½	Galatea .. .. .. ,,	5,600	19	Charner .. .. .. ,,	4,745	18	Pamyat Azova	6,000
18½	Immortalité .. .. ,,	5,600	14	Duguesclin.. .. .. ,,	5,894	18	Rurik	10,923
16¾	Impérieuse .. .. ,,	8,400	20	Dupuy de Lôme .. ,,	6,297	18	Rossia (a)	12,130
18½	Narcissus .. .. ,,	5,600	19	Latouche Tréville .. ,,	4,745	..	Rurik (No. 3) (a)	12,095
14½	Nelson .. .. .. ,,	7,630	20	Pothuau (a) .. .. ,,	5,320	12	General Admiral	4,604
13¼	Northampton.. .. ,,	7,630	14	Bayard .. .. .. ,,	5,986	13	Gerzog Edinburgski ..	4,604
18½	Orlando .. .. .. ,,	5,600	14	*Turenne .. .. .. ,,	6,400	12½	Kniaz Pojarski	5,007
12½	Shannon .. .. .. ,,	5,390	14	Vauban .. .. .. ,,	6,150	13	Minin	5,740
18½	Undaunted .. .. ,,	5,600	..	Cecille.. .. .. .. P.	5,766	17	Vladimir Monomach ..	5,796
16¾	Warspite.. .. .. ,,	8,400	..	D'Entrecasteaux .. ,,	8,114			
14½	Achilles .. .. .. ,,	9,820	..	Jeanne d'Arc (a) .. ,,	9,000			
14¾	Agincourt .. .. ,,	10,690	..	Tage .. .. ,,	7,345			
14	Black Prince .. ,,	9,210						
14½	Minotaur .. .. ,,	10,690						
14¼	Northumberland .. ,,	10,780						
14¼	Warrior .. .. .. ,,	9,210						
22	Blake .. .. .. P.	9,000						
22	Blenheim .. .. ,,	9,000						
19¾	Crescent .. .. .. ,,	7,700						
20½	Edgar .. .. .. ,,	7,350						
20	Endymion .. .. ,,	7,350						
19¾	Gibraltar .. .. ,,	7,700						
20	Grafton .. .. .. ,,	7,350						
20	Hawke .. .. .. ,,	7,350						
22	Powerful (a) .. .. ,,	14,200						
19¾	Royal Arthur.. .. ,,	7,700						
19¾	St. George .. .. ,,	7,700						
22	Terrible (a) .. .. ,,	14,200						
20	Theseus .. .. .. ,,	7,350						
	Total 31 Ships	251,000		Total 14 Ships	85,252		Total 11 Ships ..	80,574

(a) Ships building. * Built of wood.

TABLE VIII.—PROTECTED CRUISERS—SECOND AND THIRD CLASSES.

ENGLAND.			FRANCE.			RUSSIA.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
Knots.		Tons.	Knots.		Tons.	Knots.		Tons.
19¾	Æolus	3,600	19½	Alger	4,122	17½	Admiral Korniloff	5,000
17	Amphion	4,300	19¼	Bugeaud	3,722	15½	Pamyat Merkuriya	3,050
20	Andromache	3,400	19	Catinat	3,998	15	Rynda	2,950
20	Apollo	3,400	19	Cassard	3,972			
17	Arethusa	4,300	19¼	Chasseloup-Laubat	3,722			
19½	Astræa	4,360	20	Davout	3,027			
19½	Bonaventure	4,360	19	D'Assas	3,992			
19¾	Brilliant	3,600	19	Descartes	3,980			
19½	Cambrian	4,360	19	Duchayla	3,992			
19½	Charybdis	4,360	19	E 4	3,800			
19½	Eclipse	5,600	19	E 5	3,800			
19½	Flora	4,360	19	E 6	3,800			
19½	Forte	4,360	19¼	Friant	3,722			
17	Forth	4,050	20	Galilée	2,317			
19½	Fox	4,360	19¼	G 3	3,740			
19½	Hermione	4,360	19	Isly	4,160			
19¾	Indefatigable	3,600	19	Jean Bart	4,160			
19¾	Intrepid	3,600	20	Lavoisier	2,300			
19¾	Iphigenia	3,600	20	Linois	2,270			
19	*Katoomba	2,575	19¼	Pascal	3,988			
20	Latona	3,400	17	Sfax	4,502			
17	Leander	4,300	20	Suchet	3,430			
19	Magicienne	2,950						
19	Marathon	2,950						
19	Medea	2,800						
19	Medusa	2,800						
20	Melampus	3,400						
19	Melpomene	2,950						
17	Mersey	4,050						
19	*Mildura	2,575						
19½	Minerva	5,600						
20	Naiad	3,400						
19	Pallas	2,575						
19	Pearl	2,575						
17	Phaeton	4,300						
19	Philomel	2,575						
19	Phœbe	2,575						
19¾	Pique	3,600						
19¾	Rainbow	3,600						
19¾	Retribution	3,600						
19	*Ringarooma	2,575						
20	Sappho	3,400						
20	Scylla	3,400						
17	Severn	4,050						
19¾	Sirius	3,600						
19¾	Spartan	3,600						
20	Sybille	3,400						
19½	Talbot	5,600						
19	*Tauranga	2,575						
20	Terpsichore	3,400						
17	Thames	4,050						
20	Thetis	3,400						
20	Tribune	3,400						
19	*Wallaroo	2,575						
	Total 54 Ships†	196,005		Total 22 Ships	80,516		Total 3 Ships	11,000

* Australian Defence.

† Six new Talbots are projected.

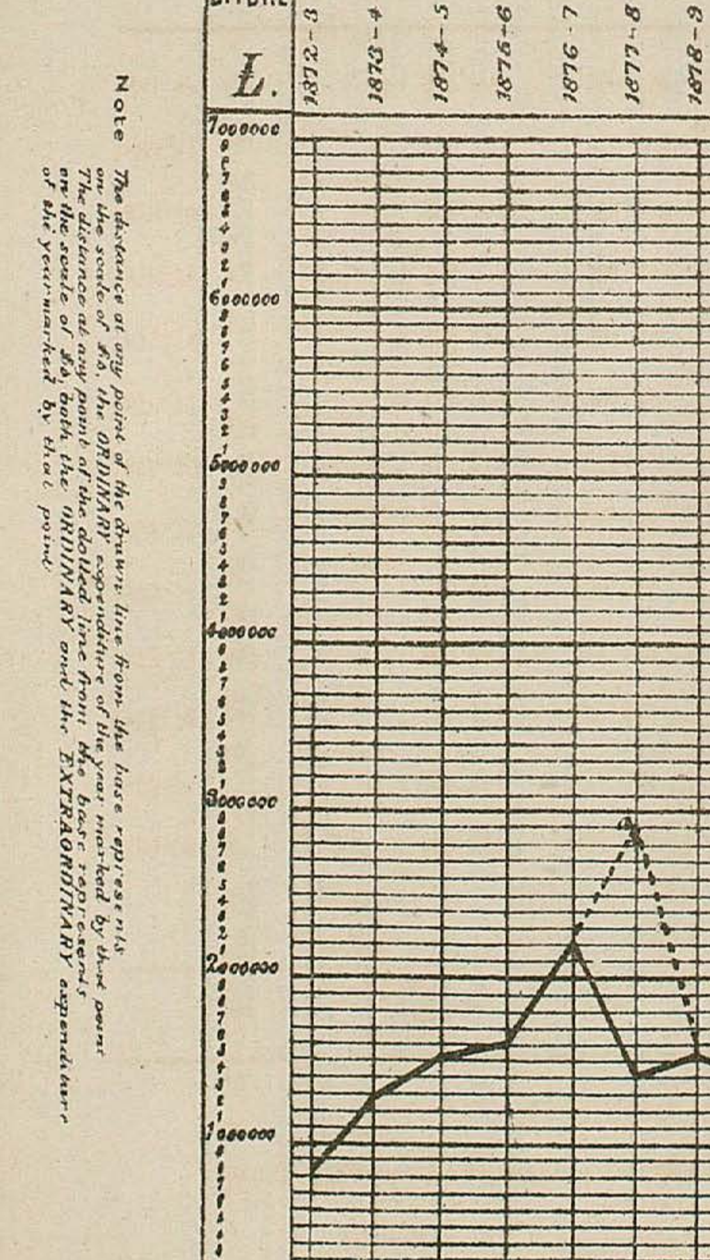
TABLE IX.—COMPARATIVE STATEMENT SHOWING EXPENDITURE ON CONSTRUCTION OF NEW VESSELS, HULLS AND MACHINERY, IN ENGLAND AND FRANCE, FROM 1869-70 TO 1894-95.

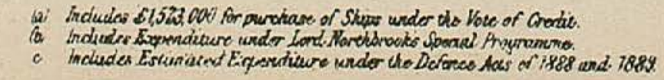
Year.	England.	France.	Year.	England.	France.	Year.	England.	France.
	£	£		£	£		£	£
1869-70	1,387,047	655,016	1882-83	1,767,014	1,559,644			
1870-71	1,330,814	411,948	1883-84	1,930,090	1,536,508	1891-92	3,026,449 a2,653,670 5,680,119	2,800,000
1871-72	1,184,172	429,832	1884-85	2,242,070	1,510,704			
1872-73	809,087	614,460	1885-86	3,737,000	1,355,684			
1873-74	1,290,028	789,684	1886-87	3,495,000	1,280,000	1892-93	2,498,213 a1,788,695 4,286,908	2,800,000
1874-75	1,528,161	921,380	1887-88	2,819,537	2,510,020			
1875-76	1,613,218	1,054,560	1888-89	2,398,805 *190,842	1,848,930			
1876-77	2,121,960	1,301,988						
1877-78	2,922,442	1,501,884	1889-90	2,455,997 a984,314 3,440,311	1,759,684	1893-94	2,641,573 a538,355 b3,179,928	2,918,120
1878-79	1,508,049	1,504,656						
1879-80	1,388,607	1,375,296						
1880-81	1,426,349	1,345,084	1890-91	2,769,651 a2,656,695 5,426,346	2,396,000	1894-95	4,804,877 a9,495 c4,814,372	3,049,720
1881-82	1,682,500	1,400,152						

* Expenditure on ships building under the Imperial Defence Act of 1888.

a Ships building by contract. Provided for under Naval Defence Act. *b* Navy Estimates for 1893-94. *c* Navy Estimates for 1894-95.

DIAGRAM SHEWING THE EXPENDITURE UPON THE CONSTRUCTION OF NEW SHIPS DURING THE 23 YEARS BETWEEN 1872-73 AND 1894-95.





(a) Includes £1,523,000 for purchase of Ships under the Vote of Credit.
(b) Includes Expenditure under Lord Northbrook's Special Programme.
c Includes Estimated Expenditure under the Defence Acts of 1888 and 1889.

1893-94 & 94-95 are Estimates.

Note The distance at any point of the drawn line from the base represents on the scale of £s, the ORDINARY expenditure of the year marked by that point. The distance at any point of the dotted line from the base represents on the scale of £s, both the ORDINARY and the EXTRAORDINARY expenditure of the year marked by that point.

Coal Consumption of Ships-of-War.

Extracts from a paper read at the Royal United Service Institution on 7th June, 1893.

BY W. H. RILEY, ESQ., R.N., Staff Engineer.

IN the first place, a brief review will be made of the nature of the services performed by a man-of-war for which coal is consumed, and its effect on the accuracy of measuring those services and the amount of coal expended for their performance.

Service of war-ship differs from merchant ship.

It is a matter of common knowledge that these services are of a much more varied and irregular character than those performed by merchant steamers. A large first-class battle-ship, capable of developing a maximum indicated horse-power of about 13,000 and a speed of 18 knots, actually on peace duty develops indicated horse-powers which vary from 9000 to less than 900, and speeds from 16½ knots to 6 knots. When a definite passage is made, it is often at a varied speed, and if steaming in company with other vessels, it is necessary for all but the leading ship to continually vary the revolutions in order to keep station, these variations often taking place several times in an hour. The helm also is brought into frequent requisition, affecting speed, revolutions, and indicated horse-power. The continuity of a passage is also often further interrupted by evolutionary exercises, during which the variation of speed and course is so great that it is impossible to measure the propelling performance.

Purposes for which coal is consumed.

Besides propulsion there are also several auxiliary services to be performed, comprising distillation from sea water for drinking and washing purposes, and for making good losses of boiler feed; lighting the ship internally by electricity; pumping water from sea for sanitary and cleaning purposes, from double bottoms, bilges, and drain receptacles; ventilating and steering ship; compressing air for torpedo work; working guns by hydraulic power; hoisting purposes and driving capstans, all of which, besides forming a varied series, are each in themselves of a more or less irregular character.

Having dealt with the difficulty of measuring accurately the

consumption of coal for the various services and the different means adopted for doing so, Mr. Riley's paper proceeds :—

"By adopting one or the other or all of the above plans vessels can approximate very closely to the expenditure for the main engines and to that for the auxiliary engines as a whole or in detail.

Besides the above expenditures there are also some others which it is necessary to distinguish from them to avoid confusing comparisons, and are, therefore, separately accounted for. They include laying fires and raising steam, banking fires, waiting orders, and steaming when the speed is so variable that no distance can be logged, as when at target practice; there is not much difficulty, however, in measuring the coal so used with fair accuracy.

Total coal expenditure in battle-ship.

Some instances of coal expenditure by war-ships under certain circumstances were given by Admiral Long in his paper on Cruisers, read in the early part of this year at the Institution of Naval Architects. The following is one of a different character, showing a six months' expenditure incurred by a large modern battle-ship on ordinary peace service :—

	Tons.
Steaming, making good distance	869
Laying fires, banking fires, steaming when no distance is logged, &c.	335
Culinary purposes and warming ship	112
Distilling for ship and boilers	481
Electric lighting	554
Other auxiliary purposes, as steering, pumping, working guns and torpedoes, ventilating, workshops, &c.	211

These services comprise four short passages of about 70 knots each and one of about 500 knots at moderately steady revolutions per minute; one passage of 500 knots at revolutions varying from 61 to 97 per minute, this including quarterly passage trials; 14 days' cruising at from 4 to 12 knots over 2000 knots, with occasional stoppages; three occasions specially under way for target practice; one electric light engine in use constantly throughout the whole period, generating a current of from 260 to 410 ampères; a second electric light engine in use occasionally a few hours at a time; 1950 tons of water distilled for ship purposes; and the usual ventilating, pumping, and other minor auxiliary machinery in daily use.

During war service the expenditure would probably be much increased, but would entirely depend on the service required. If called upon to steam long at high rates of speed the increase would be very great, and coaling would have frequently to be resorted to. It would also be increased, but not nearly to the same extent, if called upon to steam for long periods at a low speed; as this is a very

probable demand that will be made, the question is considered in some detail later on.

Consumption in battleship for main engines.

We now proceed to an analysis of the several services in greater detail, and begin with the main engines, whose object is the propulsion of the ship. The coal expended and power developed by these engines have been determined, in most ships, from definite experiments for the purpose, as well as from the ordinary occasions on which a steady speed has been maintained. The performance in a particular case may be given, that of a large battle ship, as very full and reliable data have been obtained under definite conditions, and the engines are representative of a large number of recent construction. The following are the expenditures of coal per hour per indicated horse-power:—

Percentage of full designed power.	Coal per I.H.P.
55	2·03 lbs.
28	1·82 "
22	1·93 "
14	1·76 "
7	2·2 "

There have been more economical results than these, at some of the powers, from engines of the same type, and also some worse, the expenditure being materially affected by several circumstances, such as quality of coal, differences in details of construction, and differences in management. The above figures, however, may be taken as a fair performance under good conditions.

The engines of the ship in question are of the tri-compound type, which, in the Royal Navy, is the most advanced type of engine. Its principal characteristic is economy of fuel, and its adoption has been found to have reduced coal expenditure for power, both at high and low powers, to about an average of 20 per cent. below that required by bi-compound engines, and about 50 per cent. less than that required by simple engines.

Advance in boilers.

The advance of the boilers in regard to the economical generation of steam has not kept pace with the engines in the economical use of steam; their advance has, however, been very marked in enabling the high pressures required by the later engines to be safely obtained. The old, roomy, rectangular, low pressure boiler of 30 lbs. per sq. in. enabled a large proportion of heating surface to be introduced, facilitating the passage of heat from the fire to the water, and also large furnaces and combustion chambers which allowed the fuel to burn completely and give out a large proportion of the heat it was capable of generating. The cylindrical forms necessitated by high pressures, now up to 155 lbs. per sq. in., curtailed to some extent these con-

structive features, and hence there was some falling off in the amount of water evaporated by a given quantity of fuel. It has, however, been found possible, in some of these boilers, to get a high degree of economy; at moderate powers, measurements made on board H.M.S. Thunderer showed a return of 9·6 lbs. of water per pound of fuel burnt, which was good Welsh coal. There is no doubt, however, that such a result requires both good coal and careful stoking.

* * * * * *

Economical working at reduced speeds.

A very important point, peculiar to the engines of a war-ship, is economical working at reduced speeds, and this point will be dealt with somewhat fully. The previously mentioned battle-ship averaged, on the runs made during six months, a speed of 8·6 knots, which is above the average of most other vessels. This speed corresponds to an indicated horse-power of 1300, smooth water and clean bottom; the actual average indicated horse-power would be greater than this on general service. The "ordinary speed" of such a vessel is 9½ knots, corresponding to 1800 indicated horse-power, and the most economical speed would probably be near 7 knots, 900 indicated horse-power.

Expenditure at different speeds.

The low average speed is partly the consequence of the greater distance made good per ton of coal at low speeds than at high speeds, and partly that the nature of the general service does not demand a high speed. The cause of the increased economy for distance at low speed is, no doubt, well understood, and all that need be done here is to draw attention to some of the sea speeds and consumptions determined at sea in the battle-ship in question, and which are as follows:—

I.H.P.	Speed.	Revolutions per minute.	Coal per day.	Knots per ton of coal.
			tons.	
7,220	13·66	83·6	157·5	2·08
3,600	10·9	68·1	70·4	3·7
2,870	9·92	62·0	59·6	4·0
1,810	8·96	54·2	34·3	6·2
900	6·77	41·2	21·6	7·5

The knots made good per ton of coal shows the superiority of the lower speeds in economy of fuel, this arising from the high rate at which the power increases in comparison with the increase of speed.

The most economical speed.

An important point in connection with this question is that if the speed be reduced below a certain point the distance covered by the expenditure of a ton of coals decreases. The speed at which this change takes place is termed the "most economical speed," and is of service when the chief consideration is to steam the greatest distance

for a given quantity of coal on board. It is always a very low speed; is rarely higher than that corresponding to 12 per cent. of the full forced-draught indicated horse-power, and in some vessels which have a very large proportion of power for their displacement the indicated horse-power for most economical speed is a much lower proportion.

* * * * * *

Large proportionate expenditure of coal for auxiliary services.

The coal expenditure for auxiliary purposes is a very material item in war-ships compared with the quantity used for propulsion. In the course of a year the larger modern ships generally burn as much or more for the first as the last; this is partly absolute, on account of the increase in the number of auxiliary services for which coal is used, and partly relative, on account of the low average speed and time under way compared with a merchant steamer. The proportion becomes considerably lessened in the case of a passage at a fairly high power, say at half the full power, the proportion between the coal for auxiliary services and that for propulsion being then about 9 per cent.

Large number of auxiliary engines in a war-ship.

To afford an idea of the magnitude of the auxiliary engines on board a modern ship, it may be stated that on one of the most important there are 58 distinct engines, not including boat engines, the indicated horse-power amounting in the aggregate to quite 2000. This, if continuously developed, would mean an enormous expenditure and considerably beyond what is actually incurred. As a matter of fact, several of these engines are only duplicates of others, and would not be used at the same time with them; and many are only used intermittently.

Circulating engines, &c.

It should be mentioned here that the auxiliary engines here referred to are only those which are used for purposes distinct from propulsion. The coal expenditure for such engines as the main circulating engines, main feed engines, and starting engines is included with that for propulsion. Many of the auxiliary engines do not lend themselves to economical working, as some are necessarily so far removed from the source of steam that considerable condensation takes place in transit, also they receive their steam supply at a reduced pressure and exhaust it against a comparatively high pressure. The work of some is of such a character that it is impossible to employ any material degree of expansion or to compound the cylinders. To obtain the greatest economy possible, those which can be so treated are compounded, and also a separate auxiliary boiler fitted where one of the main boilers is too large for the work, or in some cases where the main boilers are of the double-ended type, for one of these, two single-ended boilers have been substituted.

Electric light engines.

The electric light engines deserve special consideration, as one or more are in use in many ships practically all the year round, and necessitate, consequently, a considerable total expenditure of coal.

* * * * * *

A case of the expenditures on board a battle-ship and on trial in the dockyard may be quoted; the steam consumption on trial was found to be for one electric light engine generating a current of 400 ampères, such as to require a daily expenditure of 2·6 tons of Welsh coal of good average quality. The reported expenditure from the ship is 3 tons per day, and the number of lights in use such as to require from one-half to the full power of one engine. The case of the Warspite, of 8400 tons displacement, especially mentioned by Admiral Long in his recent paper, showed an expenditure for lighting on passage out to her station of over 4 tons per day. This amount was perhaps larger than that really used, insufficient opportunities having occurred to enable it to be accurately determined. Later results showed an expenditure of about 3 tons and less per day, a reduction probably assisted by economy in the number of lights and length of time in use. The reduced expenditure, however, does not appear excessive when it is considered that the engines are of the simple type.

Fresh water distillation.

Distillation of sea water is also an important item of coal expenditure. On a large ship fresh water is often required to the extent of about 12 tons per day for drinking, cooking, and washing, and about ¼ ton of water per ton of coal burnt in the boilers to make up losses of steam and water from the boilers, engines, pipes, joints, valves, &c. Both of these amounts are of a very elastic nature, and in many cases it has been found possible to materially reduce them below these figures. When direct distillation from the boilers was employed, as in the older ships, a very fair return was obtained for 1 ton of coal, about 7½ to 8 tons of fresh water. When, to avoid large quantities of scale being deposited in the boilers, double distillers were adopted, the quantity of fresh water obtained for 1 ton of coal was reduced to about 5 to 5½, the loss resulting principally from condensation of primary steam on its way to the evaporator and to the high temperature it possessed when escaping as water from the evaporator. Compound double distillers were tried and found to result in a considerable gain in the quantity of water produced for a given expenditure of fuel, and in recent ships a pair of double distillers are so fitted that they may be worked in this way. It is arranged, however, that each distiller can be worked separately when urgency requires the greatest output to be made. It may be said here, in connection with this point, that it not infrequently happens that

economy of fuel and economy of weight and space do not go together, and hence, in a man-of-war, where economy of weight and space is of such importance, economy of fuel must often to some extent be sacrificed.

Some auxiliary services might be dispensed with.

Under some circumstances of naval work, economy of coal may be of such importance that, beyond working the machinery so as to fulfil its services with the least expenditure of coal, it may be desirable and possible to dispense with some of them altogether. The character of the work must determine which of them can be dispensed with, but those which appear to lend themselves to this are the steering and electric lighting engines. Both of these use up considerable quantities of coal, which can be saved for other purposes by steering with the hand gear and using oil and candles for lighting purposes.

The exact advantage to be gained by this course depends upon the source, and is greater the slower the rate of speed. A large cruiser, say, carries 1000 tons of coal; at 10 knots speed under good conditions this will carry her, with all the ordinary auxiliary purposes in use, about 7700 knots; if the steam-steering and electric lighting engines be stopped, she will be able to cover about 8700 knots, a gain in distance of 1000 knots, or $\frac{1}{8}$th more. At a high power, say, 60 per cent. of the natural draught, she may steam about 3000 knots in the one case, and 3100 in the other, the gain in distance being only 100 knots, or $\frac{1}{30}$th more.

Expenditure in three ships over a given distance.

Before concluding this paper the progress of the coal question may be illustrated by giving some particulars of the passage of three vessels, fitted with progressive types of machinery, out to the same distant station. The first had simple engines and very little auxiliary machinery, and steamed the distance of 7082 knots at an average speed of 5·5 knots; 1575 knots were made under steam only, 5071 under steam and sail, and 436 under sail only; the total coal expenditure was 1046 tons. The effect in this case of using sail power when steaming, besides increasing the speed $1\frac{1}{2}$ knots, was to reduce the coal expenditure per knot to less than one-half what it was when the vessel was under steam only. The second vessel had bi-compound engines, boiler pressure 90 lbs. per sq. in., was fitted with a large amount of auxiliary machinery up to modern requirements, and steamed 6985 knots at an average speed of 7·7 knots, with a total coal expenditure of 1533 tons; this includes a considerable fraction for the main engines for purposes other than making good distance. The third vessel, a new ship, it is estimated from actual experience with similar types of engines, triple compound, 155 lbs. steam pressure, will steam the distance of 7000 knots for 1200 tons of coal

at an average speed of $12\frac{1}{4}$ knots. To afford an idea of the comparative power to propel these ships it may be stated that the horse-powers required to drive them at 10 knots per hour are respectively 1500, 1500, and 1350.

The first two cases showed a very material reduction in the coal expenditure for power developed in favour of the bi-compound engine; but the total amount of coal went up considerably. This is almost fully accounted for by the facts that she had no help from sails, steamed at a higher average speed, and had a greatly increased amount of auxiliary machinery in use. The expenditure for the tri-compound engines should show a still further economy for work done, but it is not likely the total expenditure will fall below that of the ship fitted with simple engines, on account of the very much larger amount of work to be performed by the machinery.

A review of some of the remarks in this paper will show that much has been done in the construction of the machinery of war-ships to enable economy of fuel to be obtained, but that the realization of this economy depends materially upon its use and treatment on actual service. So great is the influence of the latter that improved treatment has been known to have doubled the radius of action of a vessel that was obtained when the treatment was not so satisfactory. Some difficulties in the way of economical working have been considered, and it has been shown that the principal of these can be overcome to such an extent as to obtain good results on actual service. Many of these difficulties are such as to be out of the control of officers in charge of the machinery, and it is in these respects that officers in command of ships may exercise material influence on coal expenditure, especially in such matters as economy in the use of auxiliary services and in steady running, and generally in the encouragement of those under them to use every effort to keep down expenditure to the lowest limit consistent with efficiency."

How economy would be secured.

Mr. White's remarks.

In the discussion which followed the reading of the paper, Mr. White, the Director of Naval Construction, remarked: " . . . . . . With results from the same ship, at different periods of service, Mr. Riley shows that the radius of action of the ship has been doubled by savings due to better management alone. If I may venture to emphasise the statement made by Mr. Riley, I should wish to dwell upon the increased expenditure which may be involved in rapid variations of speed, or in uncertainty as to speed, or in the extended use of auxiliary services of various kinds. . . . . When a vessel is proceeding independently on a long voyage, by suitable arrangements

much may be done in the way of coal economy. Take the illustration Mr. Riley gives of what may be done by stopping the electric light or the steam steering.....The Blake or Blenheim was steered by hand up to a speed of 18 knots."

Admiral Colomb said: "Complaints are raised—I do not think, myself, properly raised—that the radius of action given in the tables (Coal Endurance in Lord Brassey's *Naval Annual*) represents a greater radius than really exists on account of the auxiliary engines. But it seems to me that what is wanted in the service is some sort of factor, some sort of divisor, which would discount the figures given, which I understand have simply to do with the powers of propulsion of the engines without taking anything else into account..... I am glad to hear Mr. White attack the too great use of machinery on board ship. When man power is capable of doing the work, I cannot help thinking it is very much better on board war-ships that the man power should do it."

Admiral Colomb's remarks.

PART V.

OUR NAVAL POSITION IN 1894.

OWING to my absence in India, my contribution to the *Annual* was considerably delayed, and prepared without having the opportunity of knowing whether the subjects with which I was dealing had been treated elsewhere. To some extent I find that I repeat what has already been given by other contributors. But I am reluctant to withdraw from all participation in the work done for the *Annual*, and with these explanations I present my contribution as a separate part.

BRASSEY.

April 12*th*, 1894.

Our Naval Position in 1894.

Introductory.

In the interval which has elapsed since the last volume of the *Naval Annual* was issued, a grave anxiety as to our naval position has possessed the British nation. Why is it that the public mind has been disturbed and doubtful? The reason is obvious. A Russian squadron has recently visited Toulon, and has there been received by the French people with an effusion of welcome which could hardly have been exceeded if Russia had rendered the most conspicuous services to the French people. The visit of the Russian fleet has drawn attention more particularly to the relative strength in the Mediterranean. It has been discovered that our squadron, as at present constituted, is inferior to the French squadron in the Mediterranean, and still more to the French supplemented by the Russian squadron.

General argument.

The general argument for an increase of the Navy could not be put more clearly and reasonably than in the speech delivered by Lord Roberts at the great representative meeting held in the City of London. "I am glad," he said, "to have been asked to support this resolution as a representative of her Majesty's Army, for in common, I believe, with every soldier—I might almost say every Britisher—who has studied the subject, I recognise that the efficiency of the Navy should be our first care, for is it not our foremost and main line of defence? Wherever our troops may be called upon to take the field, they could not hope to be successful without the co-operation of the sister service. In fact, we could hardly undertake the military operations that might be necessary for the protection of British territory and British interests in any part of the world unless our maritime superiority were fully assured. Now the problem which the British nation has to consider at the present time is briefly this. Our Empire is widely scattered, and a great part of the population not only gains its livelihood by our foreign trade, but obtains a very large proportion of its food supplies from abroad. Our sea-borne commerce, moreover, enormously exceeds that of any other Power, and the security of that sea-borne commerce is of the most vital importance to the United Kingdom. On the other hand, we see that two foreign nations (France and Russia), whose maritime commerce is comparatively insignificant, and whose colonial posses-

sions are of very minor importance—nations, too, it must be remembered, which are self-contained and self-supporting—are each of them spending nearly as much on naval construction as we are. The actual figures for the current year are, I understand, £2,918,000 for France, £2,692,000 for Russia, and £2,982,000* for England. Every nation has, of course, the right to spend what it thinks proper on its army and navy ; but it is for us, as a matter of ordinary prudence, to consider what will be the effect on our own position of the rapid growth of the French and Russian navies. It appears to me to be inevitable that, unless we take the requisite steps to insure our continuance of the undisputed mastership of the sea, by strengthening our Navy in proportion as the navies of other European Powers are strengthened, it will not be long before we shall have lost that naval supremacy which is essential to our national greatness and to our national existence."

We are dependent, as no other great nation is dependent, upon our sea-power for our supply of food, for the external trade and commerce from which our teeming population earn their living, and for that political influence, more especially in Europe, which a nation, standing in the van of civilisation, is bound in honour and in duty to itself and to the world to claim. To be well provided with the means of defence, and essentially defence by sea, is the best guarantee for the peace of Europe and the honour and independence of Great Britain.

Ships in commission.

We may now proceed to the consideration of comparative statements, showing how we stand in relation—

(I.) To ships in commission.

(II.) To ships building and completing.

(III.) To the total strength in ships on the lists of the leading naval powers.

Dealing first with ships in commission within the limits of the Mediterranean command, the French squadron, permanently commissioned, consists of the following ships :—

Ironclads.	Tons.	Launched.
Amiral Baudin	11.380	1883
Amiral Duperré	10,487	1879
Dévastation	9,640	1879
Hoche	10,650	1886
Magenta	10,580	1890
Marceau	10,580	1887
Neptune	10,580	1887
Formidable	11,440	1885

* The figures in the Navy Estimates for 1893–94 are £3,179,928.

Cruisers.	Tons.	Launched.
Alger	4,120	1889
Davout	3,027	1890
Tage	7,345	1886
Cosmao	1,880	1891
Torpedo-Cruisers.		
Faucon	1,240	1887
Léger	450	1891
Levrier	450	1891
Wattignies	1,310	1891

The list of vessels in reserve and commissioned for six months only includes :—

Ironclads.	Tons.	Launched.
Caïman	7,200	1885
Colbert	8,460	1875
Indomptable	7,170	1883
Richelieu	8,770	1873
Terrible	7,713	1881
Cruisers.		
Forbin	1,848	1888
Milan	1,550	1886
Torpedo-Cruisers.		
Condor	1,240	1885
Dague	395	1885
Dragonne	395	1885
Flèche	395	1885

The French *escadre du nord* includes :—

Ironclads.	Tons.	Launched.
Fulminant	5,650	1877
Furieux	6,000	1883
Requin	7,200	1885
Suffren	7,780	1870
Tonnerre	5,590	1875
Victorieuse	4,700	1875
Cruiser.		
Isly	4,160	1891
Torpedo-Cruisers.		
Epervier	1,240	1885
Lance	395	1886
Salve	395	1886
Surcouf	1,850	1888

The Russian squadron which recently visited Toulon consisted of 5 ships: the Emperor Nicolas I., Admiral Nachimoff and Pamyat

Azova, which may be described as ironclads of the second class. They were attended by a protected cruiser and a gun-vessel.

The British fleet in commission in the Mediterranean consists of the following ships:—

	Tons.	Launched.
First-class Battle-ships.		
Anson	10,600	1886
Camperdown	10,600	1885
Collingwood	9,500	1882
Dreadnought	10,820	1875
Hood	14,150	1891
Howe	10,300	1885
Nile	11,940	1888
Ramillies	14,150	1892
Sans Pareil	10,470	1887
Trafalgar	11,940	1887
First-class Cruisers.		
Edgar	7,350	1890
Hawke	7,350	1891
Second-class Cruisers.		
Œolus	3,600	1892
Amphion	4,300	1883
Arethusa	4,300	1882
Spartan	3,600	1891
Third-class Cruisers.		
Barham	1,830	1889
Scout	1,580	1885
Surprise	1,650	1885
Fearless	1,580	1886
Sloops.		
Gannet	1,130	1878
Melita	970	1888
Dolphin	925	1882
Vulcan	6,620	1889
Polyphemus (torpedo ram)	2,640	1881
Cruiser (training ship)	1,130	
Humber (store ship)	1,640	
Imogene (yacht)	460	1882
Gunboats.		
Cockatrice	600	1880
Gleaner	735	1890
Skipjack	735	1889
Bramble	715	1886
Don	363	1876

Our Channel and Coastguard squadrons are constituted as follows:—

CHANNEL FLEET.

First-class Battle-ships.	Tons.	Launched.
Empress of India	14,150	1891
Resolution	14,150	1892
Rodney	10,300	1884
Royal Sovereign	14,150	1891
Armoured Cruisers.		
Immortalité	5,600	1888
Narcissus	5,600	1886
Bellona	1,830	1890
Speedwell	735	1889

COASTGUARD OR RESERVE SQUADRON.

Battle-ships.	Tons.	Launched.
Alexandra	9,490	1875
Colossus	9,420	1882
Edinburgh	9,420	1882
First-class Armoured Cruisers.		
Aurora	5,600	1887
Australia	5,600	1886
Galatea	5,600	1887
Narcissus	5,600	1886
First-class Cruiser.		
Mersey	4,050	1885
Third-class Cruiser.		
Bellona	1,830	1890
Special Service.		
Hearty	1,300	1885
Jackal	750	1885
Flagships. Home ports.		
Inflexible	11,880	1876
Warspite	8,400	1886

In considering our naval position, we must take into view our fleet as a whole. A comparison extending beyond the limits of the Mediterranean will show that our force in commission is not below that standard of equality to any two Powers, as laid down by the late Government, and accepted, without question, by Parliament.

I have not included torpedo-boats in this statement of the British force in commission in Home waters. We have a large number ready for sea at short notice. We have no inferiority to the French in torpedo-boats for the defence of our own coasts. In the Mediterranean we are weak.

Our relative strength in ships built and building has been recently set out authoritatively in the return (No. 465) presented to Parliament

by the Admiralty. The following figures were quoted by Sir John Hay in his opening address at the Institute of Naval Architects :—

	ARMOUR-CLAD BATTLESHIPS.							Combination of Two Powers.			
	Gt. Bn.	Fr.	Rus.	Ger.	It.	U. S.	All.	Fr.-Rus.	Fr.-Ger.	Fr.-It.	Fr.-U.S.
First Class ..	22	18	10	4	12	4	48	28	22	30	22
Second Class ..	12	13	8	7	4	—	32	21	20	17	13
Third Class ..	11	6	—	11	5	2	24	6	17	11	8
Total Battleships	45	37	18	22	21	6	104	55	59	58	43
	In the return No. 465 nine first-class cruisers may be classed as third-class battleships. I add them accordingly:—										
	9										
Giving	54	37	18	22	21	6	104	55	59	58	43

An estimate of relative strength, carefully prepared at the Admiralty, was laid before the House of Commons by the Chancellor of the Exchequer in the debate on Lord George Hamilton's motion. In first-class battleships completed we had nineteen, against ten French ships. Our list included eight ships of 14,150 tons ; the average tonnage of the French ships was 10,000 tons. Our ships had an advantage of more than a knot in speed.

Looking to the future, it was admitted that the position became less favourable. In 1898 all the ships now in process of construction by all countries will be completed. Of the English, the Renown will be finished in 1896–7 ; the Majestic and the Magnificent, only just begun, we also expect to finish in 1896–7. These, added to the others, will before 1898 give England twenty-two first-class battleships. In France there will be added in 1895–6—about a year and a-half hence—three French ships, raising the number of the French Fleet to thirteen. In the year 1897–8 there will be added two more, making the total fifteen. So that in the year 1898 the relative strength of the French and English navies will be fifteen to twenty-two. The Russians have one battleship in European waters and three in the Black Sea. Two more are building in the Black Sea, and will be completed in 1895–6, and there are three others building which will be completed in 1897–8. These will make altogether four Russian battleships in European waters and five in the Black Sea.

On battleships, supported by the auxiliaries which are absolutely indispensable, our command of the sea depends. In first-class battleships completed we are up to our accepted standard of strength. Our deficiency is in the number of new ships in an early stage of advancement.

The following lists were published by Lord George Hamilton in the *National Review* :—

TABLE 1.] EFFECTIVE BATTLE-SHIPS, 1889, BEFORE NAVAL DEFENCE ACT.

ENGLAND.			FRANCE.			RUSSIA.		
Tonnage.	Name.	Date of Launch.	Tonnage.	Name.	Date of Launch.	Tonnage.	Name.	Date of Launch.
7,550	Bellerophon	1865	7,578	Ocean	1860	9,700	Peter the Great	1872
8,680	Hercules	1868	7,775	Marengo	1869	8,500	Alexander II.	1887
9,290	Sultan	1870	7,600	Suffren	1870	5,800	Vladimir Monomak	1883
8,320	Monarch	1868	9,000	Friedland	1873	5,800	Minin	1879
6,010	Audacious	1869	9,000	Richelieu	1875	7,800	Admiral Nakhimoff	1885
6,010	Invincible	1869	8,700	Colbert	1875			
6,010	Iron Duke	1870	8,700	Trident	1876	37,600	5 in number.	
6,910	Swiftsure	1870	4,700	Triomphante	1877			
6,640	Triumph	1870	9,000	Redoutable	1876			
4,010	Hotspur	1870	11,000	Ad. Duperré	1879			
9,330	Devastation	1871	10,400	Devastation	1879			
9,330	Thunderer	1872	10,400	Courbet	1881			
10,820	Dreadnought	1875	7,000	Terrible	1881			
9,310	Neptune	1874	7,000	Indomptable	1883			
9,490	Alexandra	1875	7,000	Requin	1885			
9,170	Superb	1875	7,000	Caiman	1885			
5,440	Rupert	1872	11,200	Ad. Baudin	1883			
8,540	Téméraire	1876						
4,870	Belleisle	1876	113,053	17 in number.				
4,870	Orion	1879						
11,880	Inflexible	1876						
8,660	Agamemnon	1879						
8,660	Ajax	1880						
6,200	Hero	1885						
6,200	Conqueror	1881						
9,420	Edinburgh	1882						
9,420	Colossus	1882						
9,500	Collingwood	1882						
10,300	Howe	1885						
10,300	Rodney	1884						
10,600	Benbow	1885						
10,600	Anson	1886						
262,340	32 in number.							

Or a combined French and Russian force of 150,653 tons and 23 ships as against our 262,340 tons and 32 ships.

TABLE 2.]

BATTLE-SHIPS AND COAST-DEFENCE VESSELS, AFTER NAVAL DEFENCE ACT.

Additions between April, 1889, and 1st April, 1894.

ENGLAND.			FRANCE.			RUSSIA.		
Tonnage.	Name.	Date of Launch or Commencement.	Tonnage.	Name.	Date of Launch or Commencement.	Tonnage.	Name.	Date of Launch or Commencement.
10,600	Camperdown	1885	10,500	Hoche	1886	10,200	Sinope	1887
12,000	Trafalgar	1887	11,200	Formidable	1885	10,200	Tchesmé	1886
12,000	Nile	1888	10,400	Marceau	1882	10,200	Catherine II.	1887
10,500	Victoria	1888	10,500	Magenta	1883	8,100	12 Apostles	1891
10,500	Sanspareil	1887	10,500	Neptune	1883	6,000	Gangoot	1891
14,150	Royal Sovereign	1889	6,500	Jemmapes	1890	9,500	Navarin	1892
14,150	Hood	1889	6,500	Bouvines	1890			
14,150	Empress of India	1889				54,200	6 ships.	
14,150	Ramillies	1890	66,100	7 ships.				
14,150	Repulse	1890						
14,150	Revenge	1891						
14,150	Resolution	1890						
14,150	Royal Oak	1890						
10,500	Centurion	1891						
10,500	Barfleur	1890						
189,800	15 ships.							
10,500	Victoria deducted,							
179,300	14 ships.							

Or 14 ships and 179,300 tons—British—as against 13 ships and 120,300 tons of France and Russia.

TABLE 3.] BATTLE-SHIPS, COAST-DEFENCE VESSELS, AND FIRST-CLASS CRUISERS BUILDING ON 1ST JAN., 1894.

ENGLAND.			FRANCE.			RUSSIA.		
Tonnage.	Name.	Date of Launch.	Tonnage.	Name.	Date of Launch.	Tonnage.	Name.	Date of Launch.
12,500	Renown . . .	Building	11,000	Brennus . . .	Completing	10,300	George the Victorious	Completing
14,900	Magnificent . .	About to be commenced	12,000	Lazare Carnot . .	Building	11,000	Petropaulowski. .	Building
			11,900	Charles Martel .	Completing	11,000	Pultava . . .	"
14,900	Majestic . .	Projected	11,600	Jauréguibery . .	Building	11,000	Sebastopol . .	"
14,000	Terrible . . .	Projected	12,200	Bouvet . . .	"	8,900	Cizoi Veliky . .	"
			11,800	Massena . . .	"	12,500	Tri Sviatitelia . .	"
56,300	4 vessels.		6,400	Trehouart . .	Completing	4,200	Ad. Ortshakoff . .	"
			4,700	Bruix . . .	Building	4,200	Ad. Senjavin . . .	"
			4,700	Chanzy . . .	Completing	11,500	Rurik No. 2 . .	"
			5,300	Pothuau . . .	Building	11,500	Rurik No. 3 . .	Projected
			6,400	Valmy . . .	Completing			
56,300 tons and 4 vessels—British—as against 210,300 tons and 23 vessels of France and Russia.			8,100	Jeanne D'Arc . .	Commencing	96,100	10 vessels.	
			8,100	D'Entrecasteaux .	"			
			114,200	13 vessels.				

The number of protected cruisers built and building for our own and other Governments is shown in the following table.

	ARMOURED CRUISERS.									Combination of Two Powers.					
	Gt. Bn.	Fr.	Rus.	Ger.	It.	U.S.	Aus.	Sp.	All.	F.-R.	F.-G.	F.-It.	F.-U.S.	F.-Aus	F.-Sp.
1st Class Cr.	31	14	11	—	6	3	1	6	41	25	14	20	17	15	20
2nd Class Cr.	47	25	2	9	—	—	4	—	40	27	34	25	25	29	25
3rd Class Cr.	51	31	3	19	—	—	7	—	60	34	50	31	31	38	31
	129	70	16	28	6	3	12	6	141	86	98	76	73	82	76
	9	Deduct 9 in third-class battleships.													
	120	70	16	28	6	3	12	6	141	86	98	76	73	82	76

Amongst the British ships are included the Powerful and Terrible of 14,000 tons displacement and 22 knots speed, intended as an answer to the Russian Ruriks.

Programme for 1894-5.

Having given the relative positions of the British and foreign navies, we turn to the proposals for 1894–5 submitted to Parliament by Lord Spencer.

We may commence with the manning of the Navy. The large additions to the fleet in recent years have entailed a corresponding addition to the number of officers, seamen and marines. The increase proposed for 1894–5 is 6,700, bringing up the total strength of the *personnel* of the Navy to 83,400. This increase includes additions of 350 to the engine-room artificers, 2,450 to the number of stokers, and 500 to the Royal Marines, making the aggregate strength of that fine force 15,500 men. The Navy Estimates for 1894–5 provide for entering 800 seamen direct from the mercantile marine, and for giving six months' training to 700 men of the R.N.R. in ships of the fleet.

In the coming financial year it is proposed to commence seven battleships of the first-class, six cruisers of the second-class, and two sloops.

The main features of the new battleships will follow generally the designs of the Majestic and Magnificent. It is proposed to build five of the battleships in dockyards, two at Portsmouth, two at Chatham, and one at Pembroke.

On the first of the vessels to be built at Portsmouth and Chatham and on the battleship at Pembroke it is proposed to make substantial progress during the year; on the second vessels to be built at Portsmouth and Chatham it is proposed to incur only a moderate expenditure, sufficient to open out the work, so that in the following year the vessels may be rapidly advanced. Two of the battleships will be built by contract.

The six second-class cruisers will be of the Talbot type, and will be built by contract.

It is proposed to build at Devonport two twin-screw sloops. These vessels are specially adapted for service on the China station, and will take the place of gunboats like the Swift and Linnet. Their machinery and boilers will be made at Devonport.

It will thus be seen that, independently of the vessels completing under the Naval Defence Act, and of six torpedo-boat destroyers which are almost or quite complete, we shall have building :—

In the Dockyards—

Eight first-class battleships.
Three second-class cruisers.
Four sloops.

In private yards—

Two first-class battleships.
Two first-class cruisers.
Six second-class cruisers.
Thirty-six torpedo-boat destroyers.

The new scheme of construction for 1894–5 forms part of a complete programme which has been arranged for a term of five years. This programme has been settled after a careful review, not only of the present relative strength of our Navy as compared with that of other Powers, but also of the number and class of ships of war which are now being built abroad.

To carry out the great programme of construction submitted to Parliament, an addition to the Navy Estimates exceeding £3,000,000 will be required. The net total for 1894–5 amounts to £17,366,100.

Consideration of Lord Spencer's Programme.

In the new programme of building, the great and elastic resources of the private trade will be largely employed. Our dockyards are indispensable as repairing and fitting-out establishments in war. They must be utilised in peace as building yards. The relative advantages of public and private administration were well and clearly set out in the report of the Commission on Warlike Stores. The Commissioners did not believe that it is possible that a great public office should be conducted with the same energy, enterprise, and general efficiency as a private manufactory. Nothing can supply the stimulus which is afforded by the prospect of individual gain and individual loss. Nor can any Government Department be organised in such a way as to make the administration as efficient as it would be if it were conducted by persons who are absolute masters of their own property, and have absolute control of their own works.

The fair inference from this appears to us to be that Government

manufacturing establishments should be upon a moderate scale; they should aim at the introduction of improvements, and especially at setting an example of perfection in workmanship and material and at ascertaining the prices for which the different stores required may fairly be purchased from manufacturing firms. We are strongly of opinion that the greater part of the warlike stores which are to be purchased should be purchased from private firms capable of supplying them.

The scheme of the Admiralty makes a fair distribution of work as between the dockyards and contractors.

And now let us ask ourselves whether these proposals are sufficient. The *Times*, which has taken a leading part in arousing public attention to the necessity for strengthening the Navy, makes the following observations:—"An examination of the latest Admiralty return exhibiting 'the battleships and cruisers built, building, and preparing to build' by England and other Powers shows that, whereas England had at the date of the return twenty-two first-class battleships built, building, and preparing to build, France and Russia combined had twenty-eight battleships of the same class 'built, building, or preparing to build or projected in 1894.' Hence, in order to keep on an equality with these two Powers—a condition accepted by Parliament and the country as the *minimum* of naval sufficiency for this country—it is manifestly necessary that the number of English battleships of the first-class should be forthwith increased by at least six vessels in the category of 'projected in 1894'—a category left blank as regards England in the return which was made up to the end of last year. The Admiralty have not only recognised this necessity, but they have in appearance at least—and, we fear, rather in appearance than in reality—gone somewhat beyond it. As the portion of the new programme allotted to the current year it is proposed to lay down seven first-class battleships, substantially of the type of the Majestic and Magnificent, six second-class cruisers of the Talbot type, and two sloops. The immediate provision of battleships thus appears on the face of it to be sufficient."

In framing our navy estimates it will be a safe rule to make the annual appropriation for shipbuilding equal to that of any two other Powers. It was Lord Northbrook's rule to lay down two ironclads for the British navy for one laid down for the French navy.

Naval Expenditure in France.

The development of naval expenditure in France is traced in the *Times* as follows:—"In our own times the expenditure of France on new naval construction has risen, steadily on the whole, though with some minor fluctuations, from £614,460 in 1872–3 to very nearly

three millions in 1893–4. It first turned the million in 1875–6, rose to a million and a half in 1877–8 and 1878–9, and, having fallen somewhat for a year or two, it again reached and stood at that figure from 1882–3 to 1884–5. Falling again for two years below the million and a half, it rose to two millions and a half in 1887–8. Then it fell for two years below the two-million limit, but in 1890–1 it stood at £2,396,000, attained £2,800,000 during each of the next two years, and now stands at no less than £2,918,120 in the estimates for 1893–4." *

French Programme, 1894-5.

The French estimates for shipbuilding for 1894–5 provide for the laying down of no fewer than thirty-two new vessels of various types, viz.: Three first-class battleships, five second-class cruisers, one third-class cruiser, one sea-going torpedo-boat, five first-class torpedo-boats, four second-class torpedo-boats, nine torpedo-launches, one second-class despatch-vessel, and three gunboats. The battleships included in the list—which will be built two in the dockyards and one by contract—will have a displacement of 11,232 tons, and engines of 14,000 horse-power, giving a speed of 18 knots. The armament of each will be four 11·8-in., ten 5·5-in., six 3·9-in., sixteen 1·85-in., ten 1·45-in., and eight revolving guns.

Russia.

The total expenditure on the Russian navy in 1894 will be £5,692,377, being an increase of £148,733 on the expenditure for 1893. The amount taken for shipbuilding in 1894 is £2,255,627.

The ships in hand are as follows:—

	Tons.
Ironclads.	
Cizoi Veliky	8,800
Poltava	10,960
Sevastopol	10,960
Petropaulowski	10,960
Ironclad Coast Defenders.	
Admiral Senjavin	4,126
Admiral Oushakoff	4,126
Cruiser (Rurik type).	
Rossia	12,915

All the above are being built in the Baltic. The Admiral Oushakoff is the only vessel on the list as yet launched. The laying down programme in the Baltic includes a repeat of the Cizoi Veliky and of the Rossia, a transport, two torpedo gunboats, and eight torpedo-boats. In the Black Sea an ironclad of the Cizoi Veliky type, and another of the Three Saints type, 12,480 tons, named the Paris, will be commenced. The most important ships to be laid down in the Baltic belong, as will be seen, to the class of armoured cruisers of the Rurik type.

* The French Navy Estimates for 1894 provide £3,049,720 for new ships.

Considerable expenditure is being incurred for the improvement of the ports of Libau and Vladivostock.

British estimated expenditure, 1894-5.

In the British Navy Estimates the aggregate expenditure proposed for shipbuilding in 1894–5 is summarised in the *Times* as follows :—

"The estimated expenditure in 1894–5 for Dockyard and Contract Shipbuilding, not under the Naval Defence Act, is £4,669,097. In addition to this, £280,933 will be voted in estimates for dockyard ships not yet completed under the Naval Defence Act, and an annuity of £1,428,571 is due from the Consolidated Fund for contract ships in the same category, but as only £16,632 is actually required for this purpose, the balance will be available towards repaying to the Consolidated Fund advances made in previous years. Thus the total amount available for new construction in the ensuing year would seem to be £4,669,067 for the new programme, £16,632 for contract ships, and £280,933 for dockyard ships under the Naval Defence Act, and 'savings on shipbuildings and of previous years,' estimated at £215,110, making a sum of considerably over £5,000,000 * in all."

This large amount may fairly be set in the balance against the aggregate expenditure of France and Russia. Looking to our great advantages in the supply of skilled labour and materials for shipbuilding at the lowest cost, it may reasonably be assumed that the tonnage built for the British navy in 1894–5 will double that completed in France.

Mr. Robertson at Dundee.

A clear exposition of the action taken by Lord Spencer and his colleagues has recently been given by the Civil Lord, Mr. Robertson. The following report of his speech at Dundee, on the 8th February, is taken from the *Daily News* :—

"Lord Spencer's administration had been attacked, but its best defence was a plain statement of the position to which it succeeded in 1892 and of the position in which it now stood. In the first place the Government had had to bear the main burden of the Naval Defence Act of 1889. The gist of that measure was that for a period of five years it sanctioned a special expenditure of ten millions in addition to the normal expenditure of the period. The ships were to be built in five years, but the payment was spread over seven. The late Government went out in 1892, leaving fully half of the ten millions to be paid by their successors. Moreover, on the Government had fallen the whole of the consequential burdens. If they built more ships they would want more men; and the manning of the fleet was not the least of the problems the Govern-

* This sum includes provision for armaments. *See* Secretary of the Admiralty's Report on page iv of the Navy Estimates for 1894–95.

ment inherited. They wanted more docks and bigger docks; and the Naval Defence Act made no provision for these nor for harbour improvements. In the Department of Works, for which he was more particularly responsible, he warned them that they would have to face the prospect of very serious expenditure. He, therefore, claimed that so far as the Naval Defence Act was a special effort the present Government would have borne the brunt of it. Turning to questions of policy, he had to protest against some of the fallacious assumptions of recent controversy. The recent agitation began in the leading weekly paper supporting the Government—the *Speaker*—and in that paper and in the *Daily News* had appeared by far the strongest and best-informed articles on the needs of the Navy. Not even the *Times*, of whose attitude he did not complain, had been more strenuous in its demands upon the Government than these organs of Radical opinion. But he asserted that the Admiralty had been in advance of them all, as it was bound to be. Lord Spencer and his colleagues had for a year had under careful consideration the numbers and types of ships to be added to the Navy with reference to the estimates of the coming year. When the Government took office they found the Naval Defence Act in full swing, large liabilities outstanding on uncompleted ships, and the estimates for 1892–3 framed by their predecessors on a certain scale. They decided after consideration to adopt and extend the policy of their predecessors, concentrating effort on the more rapid advancement and earlier completion of Naval Defence ships, but at the same time taking care to lay down a certain number of new vessels to provide for the continuous and economical employment of the men engaged in the national dockyards. For the year 1893–4 the Board practically continued on the same lines as their predecessors, voting a still larger cash provision than was made for new construction in 1892–3. This provision embraced the commencement of two battleships and two cruisers of unrivalled size and fighting qualities, besides three smaller cruisers and two smaller vessels. In addition it included 14 vessels of the 'torpedo-boat destroyer' type. Various circumstances delayed the beginning of the work on the large ships. The loss of the Victoria raised questions which required time for their solution, and so postponed the commencement of the battleships. The design of the cruisers involved careful preliminary investigations into the armaments, protection, &c., most suitable for them. The result was a later date for beginning these vessels, but they were all in hand and being pressed forward at the present time. The smaller cruisers, on the other hand, were pressed forward more rapidly than the Government had at first intended, and (what was

still more important) the torpedo-boat destroyers—a most valuable and much-needed form of defence against a newly-devised scheme of attack—were increased in number. At the present time 42 vessels of this class were in hand, instead of 20 contemplated when the estimates of 1893–4 were framed. Briefly summarised, therefore, the position at present was that, although the programme has been varied in 1893–4, it has been realised for all practical purposes, and is now in full process of execution. There was general agreement, moreover, that at the present moment in ships completed and ready for service we stand in an excellent position. But foreign nations had a larger number of ships on the stocks than we had, and this demanded immediate action on the part of the Government. We could build more rapidly as well as more cheaply than other nations, only we must never begin too late. This Lord Spencer's Board had recognised, and the programme for 1894–5 will show that there was no intention of forfeiting, or even risking in the least degree, our relative position. The estimates for 1894–5 would soon be published, and would, he hoped and believed, give satisfaction to all rational advocates of a strong navy. These estimates simply indicated the year's work and the liabilities arising therefrom. They did not contain the full programme for a period of years, although it was no breach of official propriety to say that they formed part of such a programme, carefully elaborated in all its details, but not published or intended to be published at present. Publication had been urged upon them, steps had been taken to enforce publication. There were, however, good reasons for refusing those requests. The Naval Defence Act programme was published. It showed what was intended for five years as a maximum. France and Russia at once took steps to increase their expenditure, and to keep pace with us. So the net result of this great effort left us relatively much as before in ships built and building. A programme there must be for continuous and efficient administration. If it was not published there was no possibility of its being made the standard of what other nations would do. They watch their proceedings, they could build more quickly, and so could always keep a lead in completed ships; besides choosing types that would outclass those which foreign Governments had laid down. Obviously this was a common sense and a safe policy. It secured our supremacy on the seas, and left freedom of action to the Admiralty. But it demanded the provision of the means requisite for the work to be done, in order to fulfil the requirements laid down by the responsible professional advisers of the Government, and from this burden, even in times like the present, the country would not recoil."

The country at large, and the Liberal party in particular, stand

deeply indebted to Lord Spencer for the vigour and the determination with which he has dealt with the requirements of the great service over which he ably presides. At the Cutlers' Feast, at Sheffield, he made an admirable declaration of the principles which guide his administration. "The true policy," he said, "as regards the Navy is that we must maintain and uphold the sea power of this country. We have interests around us in every sea; we have important dominions and large colonies in every quarter of the globe. Those large interests need the protection of the British fleet. We are a peaceful nation, and we wish to remain on good terms with our neighbours; but I venture to say that the best policy for this country is to maintain a powerful navy, and in doing so we shall promote the best interests of this country."

Lord Spencer at Sheffield.

It was admitted by the *Times* that the policy proclaimed by Lord Spencer was not unworthy of the best traditions of our naval history.

It could not be expected that the venerable statesman who has recently resigned the burdens of office would eagerly throw himself into the van in proposing a great increase of naval or military expenditure. But it may be claimed for my late revered leader that he has shown no unreadiness to deal adequately with the needs of the Navy. Speaking in the House of Commons, he said:—

Mr. Gladstone in the House of Commons.

"I think that I may venture to assure the House, on the responsibility of the Government, that neither the House nor the country need entertain, in the existing circumstances, the smallest apprehension as to the maintenance of the distinct naval supremacy of Great Britain."

The present Government cannot be charged with supineness in dealing with the Navy. On their accession to office a large amount of construction, commenced under the Naval Defence Act, was in progress. Lord Spencer and his colleagues have carried that great undertaking to completion with a determination and energy which entitle them most justly to grateful recognition. We have had their assurances from the first that as soon as the work of the Hamilton programme had been further advanced, new vessels would be proposed. Two battleships and two cruisers, of unsurpassed power, have already been commenced. The estimates of 1894–5 would doubtless have embodied further proposals. No Admiralty would have been justified in making the demands upon Parliament which we have now to meet, unless increased efforts had been called for by the activity of foreign Powers, and by that emphatic expression of public anxiety in regard to the Navy, without which it would be impossible to obtain the necessary appropriations for the creation of a new fleet.

Considera-tion of types of Battle-ships.

Turning from the amount of expenditure proposed for the British Navy to the types recommended by the Admiralty, the battleships constitute the leading feature in their new programme.

Admiral Bourgois.

To secure the command of the sea by battleships should always be the first object to be held in view. All the teaching of history is in this sense. The subject has been ably handled by Admiral Bourgois and Captain Mahan, U.S.N. It is highly instructive to follow the historical argument as developed by the former writer. "To fight," he says, "for the dominion of the sea, by pitting fleet against fleet, is considered by a certain school as no longer the aim and object of naval operations. They think that the torpedo has made the attack on or the blockade of naval arsenals impracticable, and that it is only by cutting off his commerce that any impression can be made on a hostile naval Power. In the war with England, during the period of the Commonwealth, the defeat of the Hogue, in 1692, led to the abandonment of the cause of the Stuarts; but the French had still powerful fleets at sea, and sustained no lasting reverses. Under the administration of Pontchartrain, in the latter years of Louis XIV. and in the reign of Louis XV., fleets of battle-ships were no longer fitted out, the efforts of the French by sea being directed solely to privateering. The result was seen in the humiliating conditions accepted in the treaty of Utrecht. Dunkirk was destroyed, the valley of the Amazon was ceded to Portugal, Newfoundland and Louisiana to England.

"In the seven years' war, the English took possession of every French colony except Mauritius and Bourbon. By the treaty of Paris, in 1763, France lost Canada, St. Vincent, Dominica, and Tobago. Private individuals had grown rich by the capture of the merchantmen of the enemy; but the consequences of the disappearance of her fleets from the seas were disastrous to France as a nation.

"In 1778, during the war of American independence, France once more sent forth powerful fleets, comprising 79 ships of the line, ably commanded by d'Orvilliers, d'Estaing, de Guichen, and Suffren. With her naval resources France was enabled to send military reinforcements to the American colonies and to support Hyder Ali and Tippoo Sahib in their struggles with the British. Minorca, Tobago, and Guiana were recovered. In the subsequent treaty of peace the conquests on both sides were mutually restored.

"The naval wars of the empire were undertaken on the part of the French at a grave disadvantage. The skilful seamen who had been so successful in the war of American independence were removed from their commands, while Nelson, at the head of the naval forces of Great Britain, was able to show what decisive and splendid results

can be achieved by winning and holding the dominion of the seas. It has been computed that no less than 38,000 men were killed or made prisoners in the French fleets. Surcouf, in command of a privateer, Bouvet and Duperré, in command of frigates, earned an illustrious reputation by hard fighting; but the successes gained at the commencement of the war by the French in India were brought to a close when the British were able to assert their decisive naval superiority by the capture of Mauritius. The operations of the allied armies in the attack on Sebastopol are a later illustration of the advantage gained by the power which has the command of the seas.

"At the end of the American War of Secession, all the cruisers of the Southern States had been captured by the Federals. The latter were masters of the sea. The ports of the Southerners were blockaded, and the movements of the troops of the North by sea were conducted without hindrance by the enemy."

A still more complete and exhaustive review brought Captain Mahan to conclusions identical with those experienced by Admiral Bourgois. **Captain Mahan.**

"The decision," he remarks, "taken by the French executive in the latter part of 1795, to discontinue sending large fleets to sea, and to rely upon commerce-destroying, remained unchanged during the following years, and was adopted by Bonaparte when the Consular Government, in 1799, succeeded that of the Directory. This policy was in strict accord with the general feeling of the French nation, as well naval officers as unprofessional men, by which the action of the navy was ever subordinated to other military considerations, to 'ulterior objects.' . . . It amounted, however, simply to abandoning all attempt to control the sea."

In another passage Captain Mahan sums up the results of his naval studies as follows:—

"On sea, as on shore, great results can only be expected by wielding great masses. Upon this conclusion history too has set its seal; for the squadron and division warfare of the French navy, seconded though it was by hosts of commerce-destroyers, public and private, produced practically no results, had absolutely no effect upon the issue of the war."

Upon general principles, therefore, as well as upon a comparison of the present relative strength in the several classes, it is evidently right that in the new programme of shipbuilding for the British Navy battleships should constitute the leading feature. The type of the seven new ships will be that of the Majestic and Magnificent, with improvements.

The battleships now to be laid down will be armed with a new

type of 12-in. gun, weighing 40 tons. The armour will be of steel, treated by the Harvey process. It is stated in Lord Spencer's explanatory note that Harveyed plates, without nickel, show resistance as great as when nickel is combined with the steel. The new system will secure a great saving in cost for a given defence.

Performances at sea of Royal Sovereign class.

In the types of our ships, and particularly in those of recent construction, an examination of all the details of hulls and armaments and their record of performance at sea cannot fail to give an assurance that we are fully abreast of our rivals in the power to design and to construct. Our latest battleships are mighty engines of war, unmatched in offensive and defensive power. When exposed to the action of waves passing at a rate which synchronises with the natural period of oscillation of the ships in still water, they are heavy rollers. All ships have their precise period. There are states of sea when the new ships roll less than those of older date. A long low swell causes the heaviest rolling. On the whole they are steady and well-behaved at sea.

The Resolution has recently undergone some rather unpleasant experiences. Taken somewhat hastily to sea, tempestuous weather was experienced. The battening down was imperfect, and water found its way below which might have been excluded. There was discomfort, but no danger.

In a recent paper, Mr. White has given for the information of the public an interesting description of the designs with the results obtained in the eight ships of the Royal Sovereign class. Their distinctive feature is the high freeboard throughout the length, the 67-ton guns, mounted *en barbette*, in seven of them being carried 23 feet above the water. The stability of the ships was anxiously considered in the preparation of the designs. In ships of war heavy weights of armour and armament are carried in positions which impose exceptional difficulties. The ships must be made stable by ample beam, while the length is limited in order to secure rapid manœuvring. A high speed is demanded. These complicated conditions, as Mr. White has shown, have been successfully met in our latest battleships.

In the discussion on Mr. White's paper Admiral Morant gave details of his experience in gales with the Achilles, Northumberland, and Minotaur. Crossing the Bay of Biscay in a south-westerly gale, and a heavy cross sea, the Northumberland rolled 40 degrees each way, the Minotaur 36 degrees, and the Achilles 34 degrees, and they took green seas on board at each side as they rolled, yet these were described as able and stable ships. All ships are liable to roll if the impulse of the sea chances to synchronise with the period of

rolling. A very remarkable instance of this was supplied in his own experience in Vigo Bay. The Agincourt, Neptune, and Hercules were proceeding under steam in nearly smooth water, when the Neptune began to roll on the swell, and rolled so heavily that her guns broke adrift, neither of the other ships rolling at all.

Admiral Boys said that his experience in the Warrior in 1869 precisely confirmed Mr. White's arguments, but it must be remembered that a ship might remain at sea for months or even years without encountering a sea that fitted her. She would establish a splendid character for steadiness, and then one day she would find a synchronising sea, and would roll her bulwarks under. He had known the Warrior and Achilles without apparent reason roll heavily for a quarter of an hour and then become steady again. The Bermuda Dock when being towed across the Atlantic had rolled 15 degrees.

The performances of the new battleships under steam are highly satisfactory. A speed, on trial, of 18 knots has been attained. In October last the Royal Sovereign steamed from Plymouth to Gibraltar in seventy-two hours, maintaining 15 knots.

The manœuvring powers of the Royal Sovereign are satisfactory. The tactical diameter is, Mr. White states, about 1,500 feet. The cost of ships of this class built in the dockyards is, exclusive of establishment charges and armament, £770,000. Increased rapidity of construction is a marked feature in the recent administration of our dockyards. Quickness in building conduces to economy.

Mr. White has designed two admirable vessels of smaller dimensions, capable of passing through the Suez Canal, and specially fitted for service as flagships on foreign stations. The Centurion and Barfleur are of 10,500 tons; their maximum speed is 18½ knots; their heavy armament consists of four 10-in. or 29-ton guns; their secondary armament consists of 4·7in. guns; their thickest armour is 12 in. on the belt and 9 in. on the barbette. With an addition of 1,000 tons to the displacement, the secondary armament might consist of 6-in. guns. Improved Centurions would be a valuable reinforcement of the Navy.

Having given the leading particulars of the latest battleships from the description of Mr. White, their most able designer, I have no desire to renew in the pages of the *Naval Annual* a controversy as to the relative advantages of large and medium ships, which must be barren of practical result. The decision of the Admiralty in reference to the new programme has been taken. The present writer would have been glad if that programme had been traced on the lines indicated in the *Daily News*, and had provided for four **Dimensions.**

Majestics and four Centurions. He accepts, without further controversy, a reinforcement to the British Navy in the form approved by a board of officers of the highest professional reputation.

The new ships will be most powerful for offence. No contrivance or skill can make them invulnerable. Below the belt of armour the largest ships are as liable to injury as those of less dimensions. The explosion of a torpedo, fired in the darkness of the night from an unseen enemy, puny, but armed with a deadly weapon, constitutes a serious danger for the big ships. The torpedo and the ram can inflict in one blow injuries such as were never wrought in the hard and prolonged fights of former days.

One merit our new ships will certainly possess. It is that of uniformity in speed and manœuvring power. No other nation will have such a fleet of battleships identical in type.

Battle-ships building abroad.

We may now refer to the types of battleships building for foreign Powers. We find the French still adhering to the complete belt. Their ships have high freeboard, and above the belt are unprotected. Their guns are carried at a great height above the water. Our ships have less freeboard. They are not protected at the water-line by a complete belt. The citadel and gun mountings are more protected than in the French ships. The French are substituting turrets for barbettes, and guns mounted in pairs for the four guns distributed in four positions, as in the ships of preceding types. The armaments of the new French battleships will consist of four 12-inch guns, ten $5\frac{1}{2}$-inch, and six 4-inch. The French are aiming at speeds equal to those attained in British ships. The later ships already built are, in the judgment of many French naval officers, overloaded with enormous superstructures, which can hardly tend to improve their behaviour at sea.

United States.

The latest battleships of the United States are of two types:—

	Iowa.	Indiana.
Length on load water-line	360 ft.	348 ft.
Breadth, extreme	72·2	69·3 ft.
Displacement in tons (normal draught)	11,296 tons	10,200 tons
Mean draught at normal displacement	24 ft.	24 ft.
Freeboard forward	19·0 ft.	11·8 ft.
Normal coal supply	625 tons	400 tons
Total coal capacity	2,000 tons	1,800 tons
Maximum indicated horse-power	11,000 H.P.	9,000 H.P.
Speed	16 knots	15 knots
Complement of officers and men	436	460

Italy.

In Italy, where the largest dimensions were formerly in favour, two ironclads, the Admiral Saint Bon and Emanuele Filiberto, have

recently been laid down, of considerably reduced displacement. The following description is from the *Engineer* :—

"The Italian battleship which is building at Venice, and has been named Ammiraglio di St. Bon, in recognition of the great services of the late Minister of Marine, is of a new type, and will have a displacement of 9,800 tons, a length of 344 ft. 6 in., a beam of 68 ft. 10 in., and an extreme draught of 24 ft. 8 in. With forced draught she will develop 13,500 horse-power, and steam at 18 knots speed; with natural draught a speed of 16 knots will be obtained with an expenditure of about 9000 horse-power. There is an over-all protective deck of steel, varying in thickness from 1½ in. to a little over 3 in. An armoured citadel, in the middle of the vessel, and the armoured belt will carry plates varying from 4 in. to 9¾ in. thick. At each end of the citadel will be a turret armed with two 9·9-in. guns. Elsewhere, with suitable shields, will be mounted eight 5·9-in., eight 4·7-in., four 2·2-in.—6-pounders—and twelve small quick-firing or machine guns. The coal-carrying capacity is to be 1,000 tons. It was originally proposed to call this ship Christoforo Colombo, a name which has been given to an unarmoured cruiser. Two similar vessels are ordered to be built, one at Spezia and the other at Castellamare. Each will have twin screws, triple-expansion engines, twelve boilers, traverse armoured bulkheads, double bottoms throughout, a great number of watertight compartments, and, in fact, every modern improvement. The definite abandonment of the over large gun by the Italian Navy, which, for the Duilio, launched in 1876, was the first to adopt it, is noteworthy. No Italian ironclad built since 1885 carries a gun of greater weight than 68 tons."

If the necessity for ships of very large dimensions is accepted, the designs adopted in foreign navies, though perhaps in some points superior, present on the whole no advantages, so far as relates to the offensive power and the system of protection, over the British types.

After carefully considering the ships of the leading naval powers, the conviction must be deeply impressed on the mind that, when all has been done that human ingenuity can accomplish, the most powerful ships are feebly protected against the tremendous powers of destruction possessed by modern naval weapons, and especially the torpedo.

Secretary Herbert, of the United States Navy, in his annual report, refers to the performances of the torpedo flotilla in the naval manœuvres of last year in the Irish Channel. One battleship and six cruisers were destroyed by the torpedo flotilla, with the loss of eighteen torpedo boats. The battleships and cruisers are valued by

Mr. Herbert at £1,950,000. Their crews aggregated 2,050 men. The value of the torpedo boats was $360,000. Their crews numbered 350 men. The torpedo may be equally formidable as an auxiliary to the battleship and as a coast defender. The late Sir George Tryon, in contemplating the chances of a naval action between fleets meeting bow to bow, was wont to speak with special apprehension of the blow which might be received from hostile torpedo-boats following close in the wake of the battleships to which they might be attached. As coast defenders, the value of the torpedo flotilla is accepted by all navies.

Blockade.

The primary duty of the British fleet must be to lie face to face with the enemy's fleet, wherever it may be, and never to relax the grip until the issue has been decided. The maintenance of close blockade must throw a tremendous strain on the British force. While the enemy rests secure in port, our fleets must keep watch and ward at sea, exposed to the attacks of the torpedo-boats at every favourable opportunity. To maintain the blockade in the new conditions of naval war, it is evident that the heavy ships in the offing must be supported by a numerous flotilla of torpedo-catchers, keeping station at night as close to the entrance of the blockaded port as possible. The torpedo-catchers should be so numerous that no torpedo-boat of the enemy's should be permitted to put to sea.

Fast cruisers should form the second line of the blockading fleet. The battleships would keep their station as the outer line, ready to go into action when the large ships came out.

In the new torpedo-boat destroyer, the Havock, Messrs. Yarrow have achieved a great success. These boats have a length of 180 ft., beam 18 ft. 6 in., displacement 210 tons, speed 26·78 knots, bunker capacity 60 tons. At 11 knots the coal endurance is equal to 3,500 knots. No less than forty-two boats of this effective type have been ordered. The numbers which would be required in case of war cannot easily be estimated. Lord Charles Beresford asks for fifty. Four times that number would not be too many.

French torpedo flotilla.

The French are laying down in 1894 a sea-going torpedo-boat and eighteen boats of smaller type. The sea-going torpedo-boat, which will be built by M. Normand, of Havre, will be a repetition of the Forban, which is now under construction, and will be of 3,200 horse-power and 30 knots speed. She will measure 144 ft. long. The first-class torpedo-boats will be of 80 tons displacement, 1,350 horse-power, and 23·5 knots speed. The second-class torpedo-boats will be of 53 tons displacement, 700 horse-power, and 20·5 knots speed. The torpedo launches, which are intended to be carried on the deck of the new torpedo depot ship Foudre, will be 62 ft. 4 in. long,

displacing 14 tons, having engines of 210 horse-power, and being capable of a speed of 16·3 knots.

In connection with the torpedo flotilla, the Admiralty may be congratulated on the successful results at last obtained in the trials of the Vulcan. With the tubes fitted with ferrules, a speed of 20·2 knots was attained without the smallest indication of weakness.

A harbour-defence ram has been recently launched for the United States Navy. Rams might be formidable antagonists and valuable auxiliaries to the largest battleships. They would be highly efficient for the Channel and for harbour defence. The capabilities of the armoured torpedo-ram were recognised in the Polyphemus. The United States ram, Katahdin, should certainly be represented in the British Navy. To "individualise ships and design them for one special purpose" is the policy recommended by Lieutenant Jaques, U.S.N., in a recent article describing the additions which have been made to the United States Navy. It cannot be said that our battleships are specially adapted for the use of the ram. They are too large and too costly to be hazarded in the delivery of a single blow, which may be as fatal to the assailant as to the assailed. They should be supported by vessels specially designed to act as rams.

Coast-defenders are not a type to which the British Admiralty have directed particular attention. Our ship-building has been designed for a bolder service, and specially with a view to offensive operations. But we must never relax our hold in the Channel, and for operations within a short distance of our own coasts the American Monitor possesses considerable merit. The type has been more fully tried in the American Navy than in any other, and it is represented by the following six ships of modern construction:—

——	Tonnage.	Speed.	Date of Launch.
Amphitrite	3,990	12 knots.	Building.
Miantonomoh	3,990	11 ,,	1891
Monadnoch	3,990	15 ,,	Building.
Puritan	6,060	12 ,,	1890
Terror	3,990	12 ,,	1869
Monterez	4,138	15 ,,	1891

Russia has in hand two ships of the coast-defence class—the Admiral Senjavin and the Admiral Oushakoff, 4,126 tons, 16 knots speed, launched in 1893.

The Admiralty have done much good work lately in the refitting of the older ships which are still reckoned efficient. The Devastation, the Monarch, and the Sultan have been in hand. The repair

of the Dreadnought will shortly be commenced. The *Daily News* has rightly urged that the best of our broadside ships should be rearmed with breechloaders.

While strength for battle must be the primary consideration, we must not neglect other classes which are indispensable for the general efficiency of the Navy. M. Bertin adopts the following analysis of the functions of the Navy, each branch of duty requiring special and appropriate vessels :—

"La marine de guerre a les objectifs suivants :

1°. "Etre maître de la mer, ce qui comporte la sécurité complète du littoral et la possibilité de menacer l'ennemi chez lui, d'attaquer ou de bloquer ses ports et d'intercepter son commerce. C'est là l'objet des escadres.

2°. "Assurer la sécurité des côtes et des ports, en face d'un ennemi maître de la mer. Les gardes-côtes se construisent pour ce but spécial, auquel peuvent concourir les autres bâtiments, même ce que leur âge rend impropres à un rôle plus actif.

3°. "Poursuivre et capturer les bâtiments de commerce et les croiseurs. C'est là un service général, nécessaire, soit quand on est maître de la mer, soit quand on évite certains adversaires ; il comporte des opérations variées ; il emploie des navires occupant tous les échelons dans l'échelle des grandeurs, de 1,500 t^x à 10,000 t^x et même à 14,000 t^x."

In the cruiser classes, brilliant successes have been achieved. The marked improvement which was exhibited in the Mersey, the Arethusa, and the Archer, has been ably followed up in the latest ships.

Cruisers. In his interesting lecture at the Royal Institution, Mr. White describes the cruisers included in the Hamilton programme as follows :—

"There are four distinct types of cruisers. Nine are of the first-class, 360 ft. long, and from 7,350 to 7,700 tons in displacement. They have maximum speeds in smooth water of 20 to 21 knots, and large coal supplies, powerful armaments, and good protection to guns, gun crews, and vitals. The heaviest guns weigh twenty-two tons each, and the main armament consists of ten 6-in. quick-firers, with seventeen smaller guns. Twenty-nine vessels are second class cruisers, eight being of one type and twenty-one of another type. They are 300 ft. to 320 ft. in length, and 3,400 to 4,360 tons in displacement. Their maximum smooth water speeds are about 20 knots, and they have good coal supplies. The armaments include 6-in. and 4·7-in. quick-firers, besides smaller guns, and they have fair protection. Four cruisers of the third class are 265 ft. long, and of

2,575 tons displacement. They are about a knot slower than the smaller second-class cruisers, and not quite so well armed, but they are equal in protection. Torpedo gunboats are of comparatively recent introduction, and are the smallest sea-going vessels built to accompany fleets. In length they vary from 230 ft. to 250 ft., in displacement from 750 to 1,100 tons. They have a light gun armament, and a powerful torpedo armament, the maximum smooth water speeds range from 19 to 20 knots. Experience has proved them to be excellent sea-boats in the heaviest weather.

"It will be noted that all these vessels are of high speed, and capable of acting together as a fleet. Further, that the Naval Defence Programme provided not merely for the largest proportionate number of cruisers to battleships above-mentioned, but gave a considerable margin over and above those requirements available for service in the protection of commerce or in other ways. If a fully constituted fleet were formed from the Naval Defence ships, including all the battleships and the equivalent number of cruisers, it would surpass in speed and fighting power any equal number of completed ships of similar classes that could possibly be brought against it from existing navies. Having been created rapidly and simultaneously, it is more homogeneous in character and better equipped for manœuvring at high speed. Its armament, also, is of the most modern description, being distinguished by the preponderance of quick-firing guns. These guns can be fired about thrice as fast as guns of equal calibre but earlier patterns, and the supplies of ammunition have been proportionately increased.

"The cruisers in hand include the Powerful and the Terrible, the one being built by contract at Barrow, and the other by Messrs. Thompson on the Clyde. Three second-class cruisers of the Talbot type are being constructed in the dockyards. Six vessels of the same class are proposed in the new programme."

The Powerful and the Majestic are ships of 14,000 tons, and 30,000 horse-power. The estimated speed is 22 knots. The armament includes two 9·2-in. and twelve 6-in. guns. These will be mounted in armoured turrets or casemates. These ships, of unprecedented size and power, have been specially designed as an answer to the three ships of the Rurik type now building in Russia. The following description of the Rurik is taken from the *Engineer*:—

"The new Russian cruiser Rurik is of 10,923 tons displacement, and measures 435 ft. long over all, by 67 ft. beam, and a draught of 26 feet. She is what is frequently called an armoured cruiser, and belongs to the class which includes the Impérieuse of 8,400 tons, and the Galatea of 5,600 tons displacement; the French Dupuy de

Lôme of 6,297 tons, the Latouche Tréville of 4,745 tons displacement, and the American New York of 8,150 tons, and the Maine of 6,648 tons displacement, as well as ships protected with sloping armour like our Blake of 9,000 tons, and Edgar of 7,350 tons displacement, the French Cécille of 5,766 tons, and the Alger of 4,160 tons displacement; and also the American Columbia of 7,475 tons displacement. She is almost 2,000 tons greater displacement than the heaviest of those mentioned above, and in respect of length she eclipses the others—by over 20 ft. in the case of the Blake, the longest of them.

"As at present arranged, her protection consists of a belt covering some 80 per cent. of total length of the ship, 7 ft. in depth, and tapering from 10 in. at the normal water-line to 5 in. below it; over this there is to be a steel deck 2½ in. thick, of curved form, and covering the whole of the vital parts of the vessel, as well as sloping down fore and aft, where the armoured belt affords little or no protection. The principal guns will be placed in armoured sponsons, two at the forward end and two at the after end of a secondary battery, also in armoured sponsons, etc. Her armament will consist of four 8-in., sixteen 6-in., six 4·7-in., and eighteen quick-firing guns, and five tubes for Whitehead torpedoes. An armoured conning tower for the protection of the captain in action, and the shoots by which the ammunition is conveyed to the guns on upper deck, will also be well protected by steel armour.

"Her motive power will consist of four sets of triple-expansion engines, which are expected to develop 13,250 indicated horse-power, with natural draught, driving twin screws, which will give her a sea speed of 18 knots. It is expected, however, that she will be able to exceed this speed when necessary. At her ordinary load draught she can carry sufficient coal to steam from Cronstadt to Vladivostock at her most economical rate, or about 18,000 knots without the necessity of calling at a coaling station to replenish her bunkers. She has been built at the yard of the Baltic Works Company on the River Neva."

D'Entrecasteaux.

Emulous of other naval powers, the French have recently laid down a vessel surpassing in size and armament any as yet built for their admirable navy. The following description is from the *Army and Navy Journal* of New York:—

"The largest cruiser for the French navy, ordered to be built at La Seyne, is named the D'Entrecasteaux. She is intended for service as flagship in distant seas, and will be sheathed and coppered. Her displacement will be 8,114 tons; length at the water-line, 393 ft. 6 in.; extreme breadth, 58 ft. 5 in.; draught, 23 ft. 6 in. She will have 14,000 horse-power, and a speed of 19 knots, carrying a possible

1,000 tons of coal. The protection consists of a 3·9-in. steel deck with above it a great number of cellular compartments for coal and stores, the whole being covered by another steel deck three-quarters of an inch thick. The whole of the hull below the protection is occupied by the machinery, boilers, bunkers, and magazines. Each of the heavier guns has its own separate ammunition hoist. These, and also all the auxiliary machinery, steering gear, internal lighting, loading and training engines, etc., will be electrical. The armament will consist of two 9·4-in. guns of 40 calibres; twelve 5·5-in. quick-fire, twelve 1·85-in. quick-fire, and four 1·45-in. quick-fire, with two submerged and five above-water torpedo tubes, two of the latter being in the bows. Each of the 9·4-in. guns will occupy a closed turret covered with 9·8-in. steel. Four of the 5·5-in. quick-fire guns will be on the spar-deck behind 2·8-in. hardened steel shields, and the remaining eight upon the main deck in sponsons behind similar shields. She will cost $3,100,000. In size she will most nearly approximate to our cruiser New York."

The sister vessel to the D'Entrecasteaux, bearing the name of Jeanne d'Arc, is shortly to be commenced.

French programme for 1894.

The French laying-down programme for 1894 is as follows:—

"The second-class cruisers, one of which will be built in a Government yard and four by contract, are of two types. The first type, which is to include the vessels provisionally known as E 4, E 5, and E 6, will be of 3990 tons displacement, 9000 horse-power, and 19 knots speed, carrying four 6·2-in., ten 3·9-in., fourteen 1·85-in., and four 1·45-in. quick-firing guns. The second type, which is to include the vessels provisionally known as G 3 and G 4, will be of 3740 tons displacement, 9100 horse-power, and 19·25 knots speed, carrying six 6·2-in., four 3·9-in., eight 1·85-in., and twelve 1·45-in. quick-firing guns. These five vessels are improved Chasseloup-Laubats. The third-class cruiser, which is to be built in a Government yard, will be a modified Galilee of 2300 tons displacement, 6600 horse-power, and 20 knots speed, carrying four 5·5-in., two 3·9-in., eight 1·85-in., four 1·45-in. quick-firing guns, and four revolving cannon."

Until the present year the French had kept the dimensions of their cruisers below the tonnage approved in foreign navies. M. Bertin, in his recent useful little volume, remarks:—

". . . . plusieurs marines présentent aujourd'hui de grands croiseurs de combat atteignant ou dépassant 10,000 tx. de déplacement; Blake, Rurik, Charles-Quint, Italia, Sardegna, etc. . . . . Parmi les navires en achèvement on peut considérer le Dupuy-de-Lôme, de 6300 tx. comme notre premier croiseur de combat; mais,

de tous les bâtiments de cette classe dans les diverses marines, il est le plus faible en déplacement et le moins armé."

The class of armoured cruisers form a special feature in recent construction for the United States Navy. The following is a list of the ships lately built and building:—

ARMOURED CRUISERS.

	Tonnage.	Speed.	When Launched.
Maine	6648	17 knots.	1891
New York . . .	8500	21 ,,	1891
Brooklyn	9250	20 ,,	Building

Three ships building or launched since 1891:—
Aggregate tonnage . . . 23,948 tons.
Average ,, . . . 7,983 ,,

ARMOURED DECK CRUISERS.

	Tonnage.	Speed.	When Launched.
Columbia	7475	22 knots.	1892
Minneapolis . . .	7475	22 ,,	1893
Baltimore	4600	20 ,,	1888
Newark	4083	19 ,,	1890
Philadelphia . . .	4413	20 ,,	1889
San Francisco . . .	4083	20 ,,	1889
Olympia	5800	20 ,,	1892
Charlestown . . .	4040	18 ,,	1888
Cincinnati	3183	19 ,,	1892
Raleigh	3183	19 ,,	1892

Ten ships building or launched since 1888:—
Aggregate tonnage 47,697
Average tonnage 4,770

The United States Naval Department are preparing plans for a new 800-ton torpedo cruiser, of 800 tons displacement, 250 feet in length, 27½ feet beam, with two decks, part of the cabin on the spar deck, a conning tower, but with no turrets or armour. This vessel will be armed with several 6-in. rifled guns, a good secondary battery and five torpedo-boats. She will be required to maintain a speed on her trial of 23 knots an hour.

Having passed in review the cruisers lately built or actually building for all the leading maritime powers, we have good reason to be content with our own ships. The two great cruisers which possibly present the most doubtful feature in our ship-building programme seem to be called for by the construction of a ship so

powerful as the Rurik. With the enormous interests we have at stake, it is absolutely necessary that our fleet should possess ships second to none among the fleets of foreign powers. As to the number of cruisers which might be required to defend our commerce, it is impracticable to fix a limit. Fleets of heavy battleships must be attended by large numbers of look-out ships. Captain Mahan insists that scouts should move in couples, one of which can carry information, while the other keeps in touch with the enemy.

In a telling pamphlet issued by the London Chamber of Commerce, the demands which might be made on the British Navy for protection are clearly set forth:—

"No comparison between the British Navy and the Navies of other Powers can usefully be made unless some account be taken of the amount of work to be undertaken by the British Navy on the one side and the Navies of Foreign Powers on the other.

"The following facts bear upon this point:—

Aggregate tonnage of the Mercantile Marine of the British Empire	**12,427,596 tons**
The aggregate tonnage of the Mercantile Marine of France is	1,057,708 tons
The aggregate tonnage of the Mercantile Marine of Russia is	481,799 ,,
Total	1,539,507 ,,
The value of our sea-borne commerce is	**£970,375,095**
The value of the sea-borne commerce of France is	£276,648,000
The value of the sea-borne commerce of Russia is	55,024,000
Total	£331,672,000

Strategic position in the Mediterranean.

The strategical position in the Mediterranean has been examined in the present Annual by another writer. In recent discussions on the Navy, the inferiority of our Mediterranean Squadron has been strongly insisted upon. The comparative statement of ships in commission already given will have shown that our position can be promptly strengthened by moving the Channel Fleet into the Mediterranean. If the coast-guard squadron were sent out as a further reinforcement, we should still possess a sufficient force in the harbour ships in the home ports to meet, on no unequal terms, any hostile squadron which might possibly appear in Northern waters. As a matter of policy, I deprecate any attempt to out-match the French in the Mediterranean. To strengthen the Channel Fleet and the Reserve Fleet is equally effective for our purpose, and less likely to

excite jealousies and to stimulate further efforts on the part of a powerful neighbour, with whom it is our anxious desire to remain on cordial terms.

It has been put forward as an element of weakness for England in the Mediterranean, that she has no resources for the building of ironclads in those waters. The Mediterranean Naval Powers must look with admiration at the work we are able to do in our dockyards at home. They may envy the British Admiralty their command of the inexhaustible capacities of our mercantile ship-building yards. The French possess in Toulon a splendid naval establishment, admirably equipped for the maintenance of a fleet, and so strongly fortified as to be able to repel any attack. They have gained a valuable port through the acquisition of Biserta. It has been greatly improved by works rapidly nearing completion, the entrance being already deepened to 25 feet of water. Corsica offers every advantage which could be desired for the creation of another naval base. The line—Toulon, Corsica, Biserta—crosses the line of communication with the East, by the Suez Canal, and affords opportunities for its interruption.

Malta and Gibraltar.

If we are resolved to retain our hold on the Mediterranean, it is imperatively necessary that our two naval bases, at Malta and Gibraltar, should be made secure from attack, and efficient for the repair and protection of the fleet. In Malta and Gibraltar we hold strategical positions of the utmost importance. We have done much at Malta; Gibraltar has been neglected. It is the key to the Mediterranean.

It is no longer possible to anchor large fleets in confined waters exposed to torpedo attack. In the great military harbours, such as Toulon and Spezia, the fleets of France and Italy are secured from destruction by torpedoes by means of low breakwaters and narrow entrances, which can be effectually guarded and closed up at night by booms and chains. It is essential that the anchorages at Gibraltar should be similarly protected by an extension of the Mole. This work will improve the facilities of carrying, which are not equal to the requirements of war. Lord Spencer announces in his Memorandum the welcome decision to extend the Mole at Gibraltar to 3,700 ft. It is proposed to commence a graving dock at once.

Turning to points of more general interest, if we abandon the Mediterranean, we cease to be a first-class power in Europe. The Mediterranean has been the source of European civilisation. By our Naval strength in the Mediterranean, we can sustain any Continental powers with whom we may be allied. The history of the past

attests the enormous influence which may be derived from a commanding naval position in these waters.

Egypt. Egypt is in the hands of the nation which commands the adjacent sea. It is essential to our interests that no other power should be able to use Egypt as an advanced base of operations. To exclude a force hostile to ourselves from Egypt, it may not be necessary that British troops should remain in permanent occupation. It is necessary that we should have a dominant Navy.

From the occupation by Napoleon onwards, France has aspired to the possession of Egypt, or, at least, to the exercise of a commanding influence in the country. With France, the desire to exercise influence on Egypt is promoted by a not ignoble aspiration after national greatness. To us, Egypt is of yet more vital consequence as an outwork for the defence of India.

It has been urged that to maintain a hold on the Mediterranean is of no importance to us commercially. At the present time, 87 per cent. of our trade with India passes through the Canal; and three-fourths of the Canal traffic is British. It would be a complete dislocation of existing arrangements to divert this trade to the Cape route. The trade of Great Britain with the Mediterranean is equal to that of France. In many ports, especially those of Italy and the Levant, our transactions greatly exceed those of any other power.

We have ceased—and very wisely so—to regard our interests in Constantinople as of transcendental importance. The city lies equally open to military and naval attack; the local resources for a fleet are slender; the commercial importance has been exaggerated. We may be indifferent as to what power possesses Constantinople, provided that our fleet is strong enough to meet all comers upon the sea.

Constantinople. Mr. Croker has some admirable observations upon the position of Constantinople:—

"No one can be more of a friend than I am to the maintenance of the Turkish Empire, because I cannot imagine what substitute could be found for the Government (even the most imperfect) of the vast and various regions over which it is spread; but I must say that this special chivalry for the integrity of the Turkish Empire, and this zeal for the balance of power, as settled in 1815, come very strangely from France and England, who never before were united in any military or political object, except in the disturbance of that balance of power by the dismemberment of the Netherlands in 1831, and the disruption of Greece from Turkey in 1826; to which let me add the seizure of Algiers by the French, acquiesced in by England, and of the Ionian Islands by England, acquiesced in by France. To

be sure, it is a proof that nations never blush, to hear those who have robbed Turkey of Greece, and Algiers and the Ionian Islands, and in a great measure of Egypt, complaining that Russia *may* entertain a wish to have a slice on the other side. Nay, we are angrily told that Russia has disturbed the balance of power in the Caucasian regions of Asia—a proceeding that occasions great indignation on our part, who conveniently forget what we ourselves have been doing in the Punjaub on one side, and in Burmah and Pegu on the other side of Asia; and who have witnessed, without daring to breathe even a sigh of disapprobation, the annexation of Texas, California, and Mexico to the United States . . . Where are these doctrines for which we are fighting in the Crimea to end? When we say that we will not suffer the Czar to advance against Constantinople to avenge a series of insults to his religion, how is it that we have no jealousy of the occupation of Rome, and the consequent control over the Roman Church?"

Our position in the Mediterranean, in relation to France, is not weakened but rather strengthened by the added responsibility which France has lately assumed by advancing from Algeria upon Tunis. Her coasts present more points open to attack by a superior Naval force. To add to territory is a source of weakness rather than of strength, unless there be a corresponding increase in the Naval forces.

Upon a consideration of all the circumstances, it is clear that the dignity, the wealth, and the influence of England for peace depend on the retention of a paramount position as a naval power in the Mediterranean. We have that position now, and the recent manifestations of popular sentiment have shown that we are resolved to keep it.

Naval Reserves.

Lord Spencer's memorandum gives interesting details of the progress of the Royal Naval Reserve.

The number of officers who have served in the fleet has advanced to 248 from 192, at the end of last year. The lieutenants' and sub-lieutenants' lists are to be increased by 50 each. The officers entered for twelve months' training on board ships of the fleet are to be raised from 50 to 70.

The first and second class reserves are particularly up to full numbers. The reserve of firemen is to be increased to 1,600. The second-class reserve men are to be embarked for sixteen working days' training on the ironclads of the reserve squadron. H.M.S. Superb and Galatea have already visited Stornoway and Lerwick for the purpose of embarking the men. Every encouragement should be given to the second-class reserve to become thoroughly efficient as gunners.

In this connection I cannot omit to mention that during a recent visit to Calcutta, I had the opportunity of seeing the naval volunteers, the local representatives of a force which unfortunately no longer exists at home. When inspected last year by Admiral Kennedy, they received high, yet not unmerited, praise. The Admiral in the course of his remarks said : "I am extremely gratified at the splendid form you have exhibited this morning, and I warmly congratulate you on your appearance and the manner in which you have gone through your drill. I must admit that, before I came to Calcutta, I hardly knew of the existence of the Calcutta Naval Volunteers, for what object they existed, and of whom they were composed ; so that it has been a matter of some surprise—but exceeding gratification—to me to see such a fine body of men, and so well drilled. At the recent Naval Exhibition in England, where we had the pick of the trained men of the Navy, the dismounting and remounting could not have been done in better time and style than I have seen it done to-day. It has been said, I believe, that there would be some difficulty in finding you employment ; but in time of war these things always adjust themselves. You could be utilised as a Naval Brigade; your services would be invaluable on the river, and I do not think there would be any objection to your manning the forts either. But there would be lots to do, in guarding mines, manning smart river craft, looking after torpedo-boats and guarding the entrance of the river, protecting the light-ships, and performing many other useful duties. For the Navy would not be here. We should be in the open looking for the enemy, and not skulking in port ; and with you here we should feel that Calcutta was being well looked after."

Especial credit is due to Commander Petley, a retired officer of the Royal Navy, for the high efficiency of the Calcutta Naval Volunteers. A similar force exists at Sydney and Melbourne. In other colonies, especially in Newfoundland and the maritime provinces of the Canadian Dominion, abundant materials exist among the fishermen for the enrolment of a splendid body of colonial Naval Reservists.

Conclusion.

The large additional expenditure on the Navy is a regrettable necessity. It is forced upon us by the action taken by other Powers, who have no colonial and commercial interests comparable to our own requiring naval protection. The necessity for a reinforcement of the Navy having been forced upon us, it will cost less in the end if we show ourselves resolved to be content with no half measures. When it is made clear that, whatever may be the sum expended elsewhere, we shall spend double the amount—that for every ship laid down elsewhere we will lay down two—it is not impossible that rival Powers may relax their efforts to deprive us of our naval supre-

macy. For ourselves, we cherish no schemes of aggression. We desire the maintenance of friendly relations with all nations, and not less with France and Russia than with other Powers. That Great Britain should be strong at sea is the surest guarantee for the peace of Europe. We cannot vie in numbers with the armies of the continental States. Our Navy must be our right arm, and Captain Mahan has taught us that sea power has a controlling influence on the course of history.

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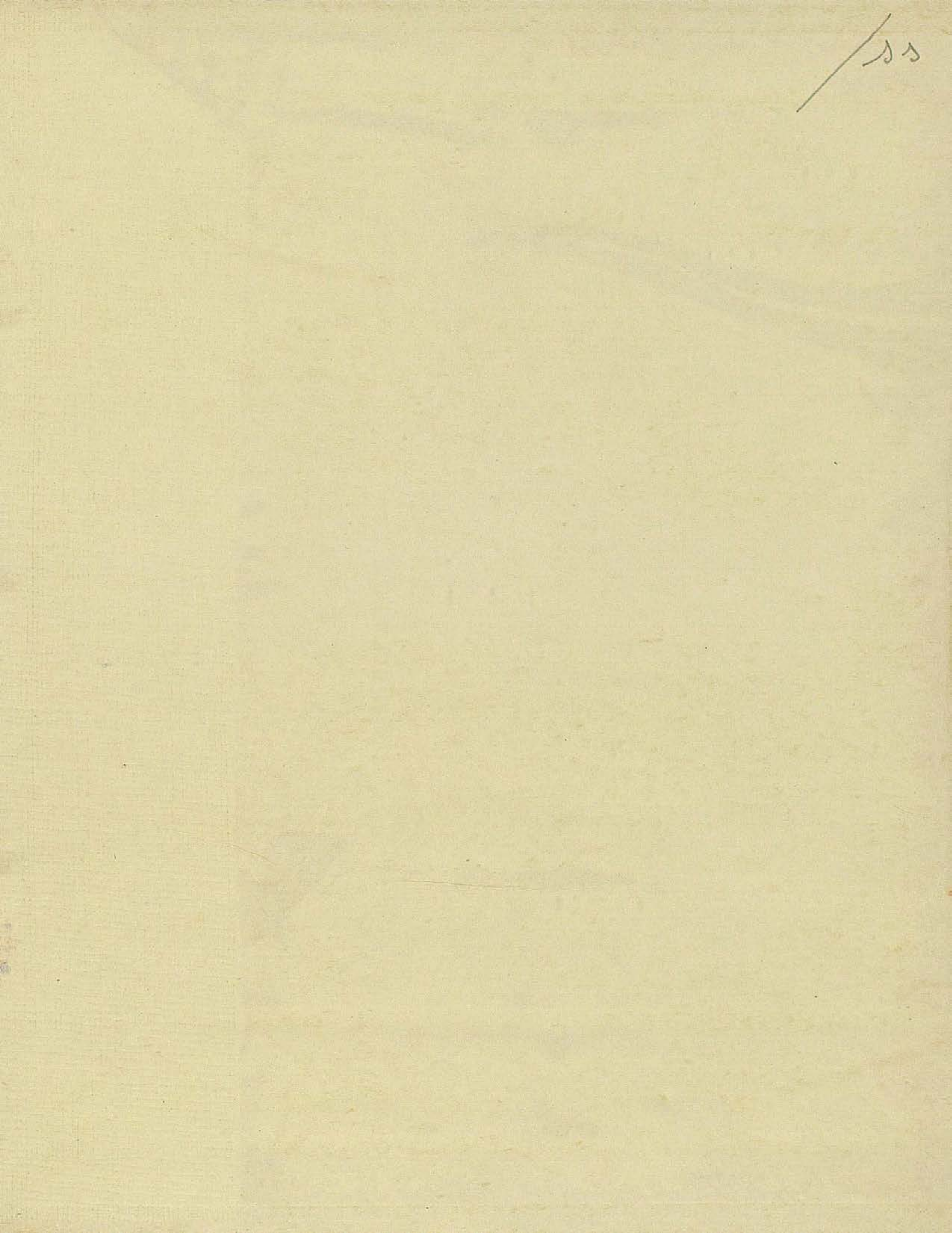
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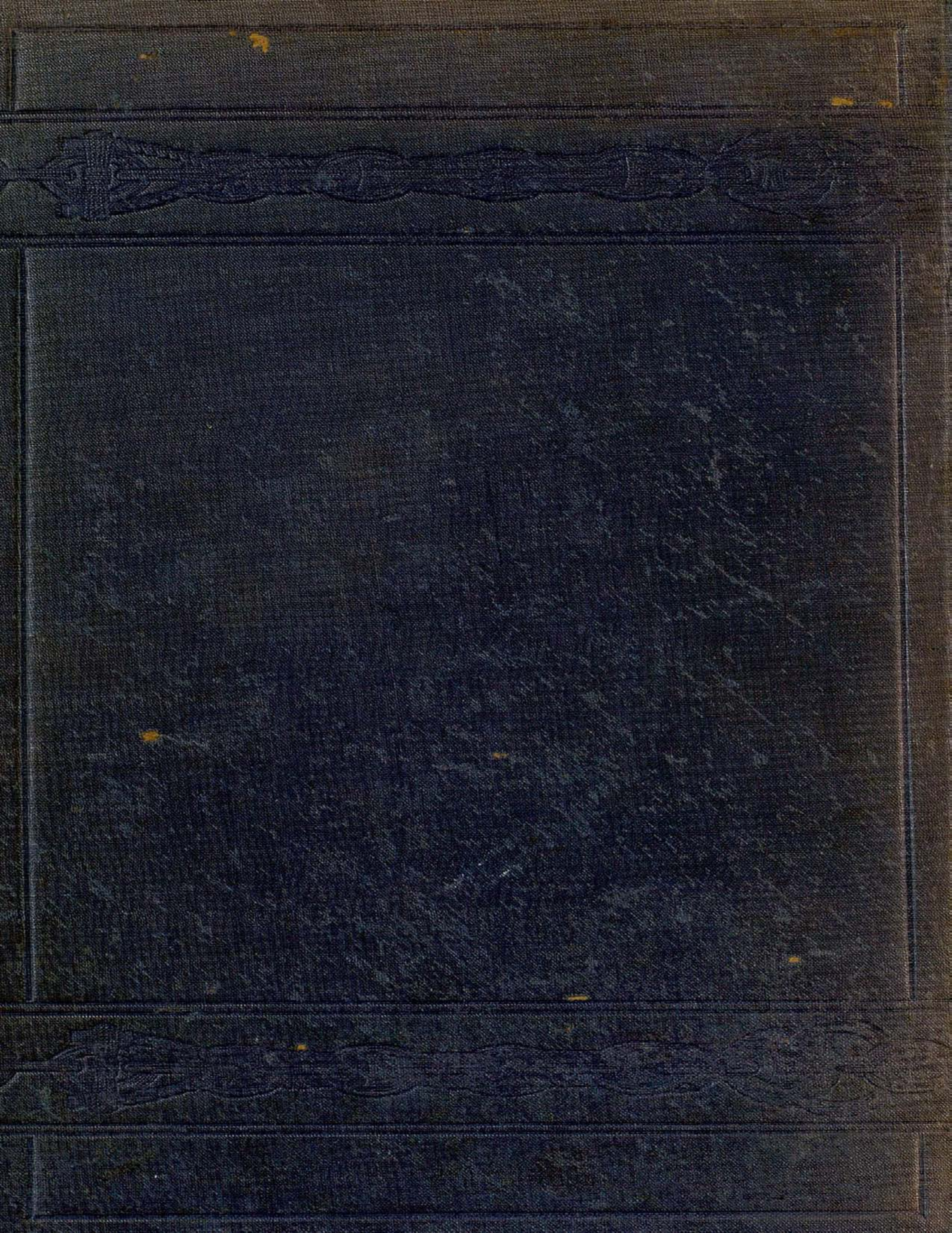
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